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PRECISION OF THE DETERMINATION OF FOCAL DEPTH FROM THE SPECTRAL RATIO OF LOVE/RAYLEIGH SURFACE WAVES

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INTRODUCTION

Accurate determination of focal depth from body wave information is usually not possible for shallow-focus earthquakes because of the difficulty in identifying depth phases such as pP. Recently the problem of determining the focal depth of an earthquake has been approached using surface wave information such as spectra and spectral ratios (Keilis-Borok and Yanovskaya, 1962; Tsai, 1969; Harkrider, 1970; Tsai and Aki, 1970a, 1970b, 1970c; and Canitez and Toksöz, 1971). Surface wave spectra are functions not only of the focal depth, but also of the earthquake source mechanism and the physical parameters of the earth. Therefore the source parameters and the Earth model must be derived from other information before the focal depth can be estimated using surface wave spectra. The purpose of the present study is to determine how sensitive the ratio of Love to Rayleigh wave spectral amplitudes is to changes in the source depth, in the shear velocity within the Earth near the source, and in the source orientation. The accuracy of the focal depth determined from surface wave spectral ratios may then be specified in terms of the accuracy of the source mechanism and of the Earth model.

The theory is now available for the calculation of the far-field displacement associated with the propagation of surface waves generated by mathematical representations of earthquake source models within realistic Earth structures. The theory for calculating surface

wave dispersion in a multilayered medium was developed initially by Haskell (1953), and was expanded by the work of Harkrider and Anderson (1962), Rosenbaum (1964), Thrower (1965), Dunkin (1965) and Saito (1967). Mathematical representations of source models for earthquakes were derived through the work of Yanovskaya (1958), Knopoff and Gilbert (1960), Ben-Menahem (1961), Maruyama (1963), Haskell (1963, 1964), Burridge and Knopoff (1964) and Haskell (1966). The relations yielding the far-field surface wave displacements due to source models located in specified realistic Earth structures were presented by Harkrider (1964) and Ben-Menahem and Harkrider (1964), and have been expanded upon in the work of Harkrider and Anderson (1966), Saito (1967), and Harkrider (1970). Using the theory developed in these studies, spectral ratios of surface waves are determined in the present study for a series of source mechanisms, focal depths, and Earth structures. An estimate is then made of the precision of focal depth determinations from surface wave spectral ratios.

THEORY

Using the notation of Harkrider (1970), the far-field expressions for Rayleigh and Love wave spectral amplitudes may be written

$$U_R = S\, k_R^m\, e^{-i(1+2m)\pi/4}\, \chi_R(\theta,h)\, E_R\, \frac{e^{-ik_R r}}{r^{1/2}}\, e^{-\gamma_R r} \tag{1}$$

$$U_L = S k_L^m\, e^{-i(1+2m)\pi/4}\, \chi_L(\theta,h)\, E_L\, \frac{e^{-ik_L r}}{r^{1/2}}\, e^{-\gamma_L r}$$

where S is the spectral source function, m = 0 for a point force source and m = 1 for a couple of double-couple source, $k_R = \omega/C_R$ for Rayleigh waves, where C_R is the Rayleigh wave phase velocity, $k_L = \omega/C_L$ for Love waves, where C_L is the Love wave phase velocity, h is the source depth, θ is the azimuth from source to station, r is the epicentral distance, and γ_R and γ_L are the Rayleigh and Love wave attenuation coefficients respectively. The terms E_R and E_L in equation (1) are given by

$$E_R = \varepsilon_o\, A_R k_R^{-1/2} \tag{2}$$

$$E_L = A_L\, k_L^{-1/2}$$

where ε_o is the Rayleigh wave ellipticity

$$\varepsilon_o = - [\dot{U}_o^* / \dot{W}_o^*] \tag{3}$$

and A_R and A_L are the Rayleigh and Love amplitude response due to a vertical point force at the surface. The radiation pattern function $\chi(\theta,h)$ given in equation (1) is

$$\chi(\theta,h) = d_o + i\,(d_1 \sin\theta + d_2 \cos\theta) + d_3 \sin 2\theta + d_4 \cos 2\theta \tag{4}$$

where the coefficients d_i are defined in Table I.

Using equations (1) and (2), the Love/Rayleigh amplitude ratio may be written:

$$J = \left|\frac{U_L}{U_R}\right| = \left|\frac{k_L^m}{k_R^m}\,\frac{\chi_L}{\chi_R}\,\frac{A_L\,k_L^{-1/2}}{\varepsilon_o\,A_R\,k_R^{-1/2}}\,\frac{e^{-\gamma_L r}}{e^{-\gamma_R r}}\right| \tag{5}$$

assuming the spectral source function S to be approximately the same for Rayleigh and Love waves.

To determine the sensitivity of the ratio Love/Rayleigh to focal depth h as compared to its sensitivity

to changes in the shear velocity β of the Earth and in the dip angle δ and slip angle λ of the fault, the following ratios of partial derivatives may be computed:

$$
\begin{aligned}
DR(h,\beta) &= \frac{\frac{\partial J}{\partial h}}{\frac{\partial J}{\partial \beta}} \\
DR(h,\delta) &= \frac{\frac{\partial J}{\partial h}}{\frac{\partial J}{\partial \delta}} \\
DR(h,\lambda) &= \frac{\frac{\partial J}{\partial h}}{\frac{\partial J}{\partial \lambda}}
\end{aligned}
\tag{6}
$$

From equations (5) and (6), we have:

$$
DR(h,\beta) = \frac{\dfrac{k_L^{m-1/2}}{k_R^{m-1/2}} \dfrac{A_L}{\varepsilon_o A_R} \dfrac{\partial}{\partial h}\left|\dfrac{\chi_L}{\chi_R}\right|}{\dfrac{\partial}{\partial \beta}\left|\dfrac{k_L^{m-1/2}}{k_R^{m-1/2}} \dfrac{\chi_L}{\chi_R} \dfrac{A_L}{\varepsilon_o A_R}\right|} ,
$$

$$DR(h,\delta) = \frac{\frac{\partial}{\partial h}\left|\frac{X_L}{X_R}\right|}{\frac{\partial}{\partial \delta}\left|\frac{X_L}{X_R}\right|}, \text{ and } DR(h,\lambda) = \frac{\frac{\partial}{\partial h}\left|\frac{X_L}{X_R}\right|}{\frac{\partial}{\partial \lambda}\left|\frac{X_L}{X_R}\right|}. \tag{7}$$

These ratios of partial derivatives are independent of the attenuation coefficients γ_R and γ_L and are dependent on frequency ω and azimuth θ.

CALCULATIONS FOR THE BASIN AND RANGE VELOCITY STRUCTURE

The Basin and Range province was chosen as a source model for study of Love/Rayleigh spectral ratios both because the earthquakes occurring within this province are typically shallow-focus and because of the availability of a large amount of seismic data for this region making possible the construction of a velocity model which may be more accurate than that obtainable for most seismically active areas. The P velocity structure chosen to represent the Basin and Range source region is based on an upper mantle model (CIT 111P) determined by Archambeau et al., (1969). The crustal model is similar to that determined by Warren (1969) for the southeastern part of the Basin and Range province. The P and S velocity structures as well as the density distribution for the Basin and Range source model are shown in Figure 1 for the crust and in Figure 2 for the upper mantle, and the parameters for the model are listed in Table II. The S velocity structure was computed from the P velocity structure by assuming a Poisson's ratio of 0.25.

Two source models were considered in the present study: left-lateral fault with dip angle of 90° and slip angle of 0° and a left lateral fault with dip angle of 90° and slip angle of 45°. Calculations were made for focal depths corresponding to a source successively positioned in the middle of each of the first six layers of the Basin and Range model. The

partial derivatives $\partial J/\partial\beta$ were computed for the first six layers for both source models. This was accomplished by successively incrementing the shear velocity β of the first, fourth and fifth layers by $\Delta\beta = 0.1$ km/sec, and, since the velocities of the second and third layers are nearly equal, incrementing the shear velocities of both these layers together by $\Delta\beta = 0.1$ km/sec. Spectral amplitudes U_L and U_R were then calculated. The partial derivatives of spectral ratio with respect to dip angle δ, $\partial J/\partial\delta$, were computed by varying δ by 10° and computing the spectral ratio for each source depth for slip angles λ of 0° and 45°. Partial derivatives of spectral ratio with respect to slip angle, $\partial J/\partial\lambda$, were calculated from the difference in the computed spectral ratios for slip angles 0° and 45°. Because of the large differential in slip angle, the calculated derivative is accurate enough only for rough estimates. Depth partials, $\partial J/\partial h$, were computed by taking differences in spectral ratios for sources within the i^{th} and $(i + 1)^{th}$ layers. It is possible by means of the depth derivatives given by Harkrider (1970) to determine analytically the partials $\partial J/\partial h$ for changes in source depth which occur completely within any given layer.

The fundamental mode phase and group velocity dispersion for Rayleigh and Love waves for the Basin and Range model are shown in Figures 3 and 4. The fundamental mode radiation pattern functions χ_R and χ_L for the two sources studied are presented in Figures 5 through 20 for periods of 20 to 40 seconds. These radiation patterns show that the amount of energy

propagating from a source decreases with increasing depth for periods of 20 to 40 seconds. For the source with a strike of 0°, a dip angle of 90° and a slip angle of 0°, both the Rayleigh and Love radiation patterns for periods of 20 and 40 seconds have four equal lobes for all depths. For the source with a strike of 0°, a dip angle of 90° and a slip angle of 45°, only the Love wave radiation patterns have four equal lobes over the depth range examined. Love/Rayleigh spectral ratios are given in Figures 21, 22 and 23 for a few selected source geometries. Figure 21 illustrates the variation in J as a function of θ. The dependence of J on the source parameters λ and δ is illustrated in Figure 22, and Figure 23 shows the change in J due to change in only focal depth. From Figures 21, 22 and 23, the orientation of the source can be seen to have as great an effect on the Love/Rayleigh spectral ratio as does the focal depth. The period at which a maximum occurs in the Love/Rayleigh ratios (corresponding to a minimum in the Rayleigh wave amplitude) can also be seen to vary with source parameters such as dip and slip angles as well as with focal depth.

The partial derivative ratios $DR(h,\beta)$, $DR(h,\delta)$ and $DR(h,\lambda)$ given in equation (6) may be interpreted as the changes $\Delta\beta$, $\Delta\delta$, and $\Delta\lambda$ respectively which would produce the same change in J as a change Δh in h of 1 km. Therefore the values of $DR(h,\beta)$, $DR(h,\delta)$ and $DR(h,\lambda)$ given in Tables III, IV and V respectively may be used to determine how accurately the shear velocity of the Earth and the dip and slip angles of the source must be

known in order to determine the focal depth to some desired accuracy. Consider, for example, that it is desired that the focal depth be determined correct to within $\pm$ 5 km. Then the values of $\Delta\beta$, $\Delta\delta$, and $\Delta\lambda$ which would produce the same change in J as a change in h of 5 km are given by multiplying the values of DR(h,β), DR(h,δ) and DR(h,λ) in Tables III, IV and V by a factor of 5. The resulting $\Delta\beta$, $\Delta\delta$ and $\Delta\lambda$ are larger respectively than 0.2 km/sec, 10° and 10° for sources in certain layers but are smaller for sources in others. Moreover, $\Delta\beta$, $\Delta\delta$ and $\Delta\lambda$ are a function of azimuth and if a combination of changes in shear velocities, dip angle, and slip angle were made, the result could equal to a Δh of 5 km with $\Delta\beta < 0.2$ km/sec, $\Delta\delta < 10°$ and $\Delta\lambda < 10°$ for sources within several of the layers.

Therefore the conclusion must be that the accuracy of the focal depth determined from Love/Rayleigh spectral ratios is very much dependent not only on the velocity structure and source parameters but also on the layer in which the source is located and the azimuth of the recording station from the source. In some cases, the shear velocity of the model near the source would need to be known to better than $\pm$ 0.2 km/sec and the dip and slip angles to better than $\pm$ 10° in order to attain an accuracy of $\pm$ 5 km in the focal depth.

If spectral ratios are available for several different values of period and several stations, the depth resolution could be better. However, consideration of the first or fifth column of Table III for a slip

angle of 0° shows that the error can be of the same sign at every station and frequency; and one would not, therefore, expect it to be minimized by any "least squares" procedure. With respect to determining depth by finding nulls in the spectra, column two of Table III shows that the errors can have the same pattern as a function of azimuth at every frequency, thus leading to a consistent shift of the null frequency.

DISCUSSION

The accuracy of the focal depth determined from the spectral ratio of Love wave to Rayleigh wave energy depends upon the accuracy of the mathematical models used for the Earth structure and for the source mechanism. Recent studies by Tsai and Aki (1970a, b, c) and Canitez and Toksöz (1971) have concluded that it is possible to determine the focal depth to an accuracy of a few kilometers if the source mechanism and the Earth structure are reasonably well known. However, in order to define the terms "reasonably well known", the partial derivative $DR(h,\beta)$, $DR(h,\delta)$ and $DR(h,\lambda)$ should be available for models of the Earth structure and for the source mechanism which are close to those being assumed in the calculation of the focal depth. In some cases it probably will not be possible to estimate the focal depth to within a few kilometers of the correct value from surface wave spectral information alone.

We see that it is not true, as often hypothesized, that error due to lack of knowledge of the velocity structure will be reduced to negligible proportions by using Love/ Rayleigh spectral ratios, instead of Love or Rayleigh spectra values alone, to determine source parameters. Also the difficulty in determining the dip and slip angles to better than 10° may in many cases preclude the determination of focal depth from surface wave spectral information to an accuracy of a few kilometers.

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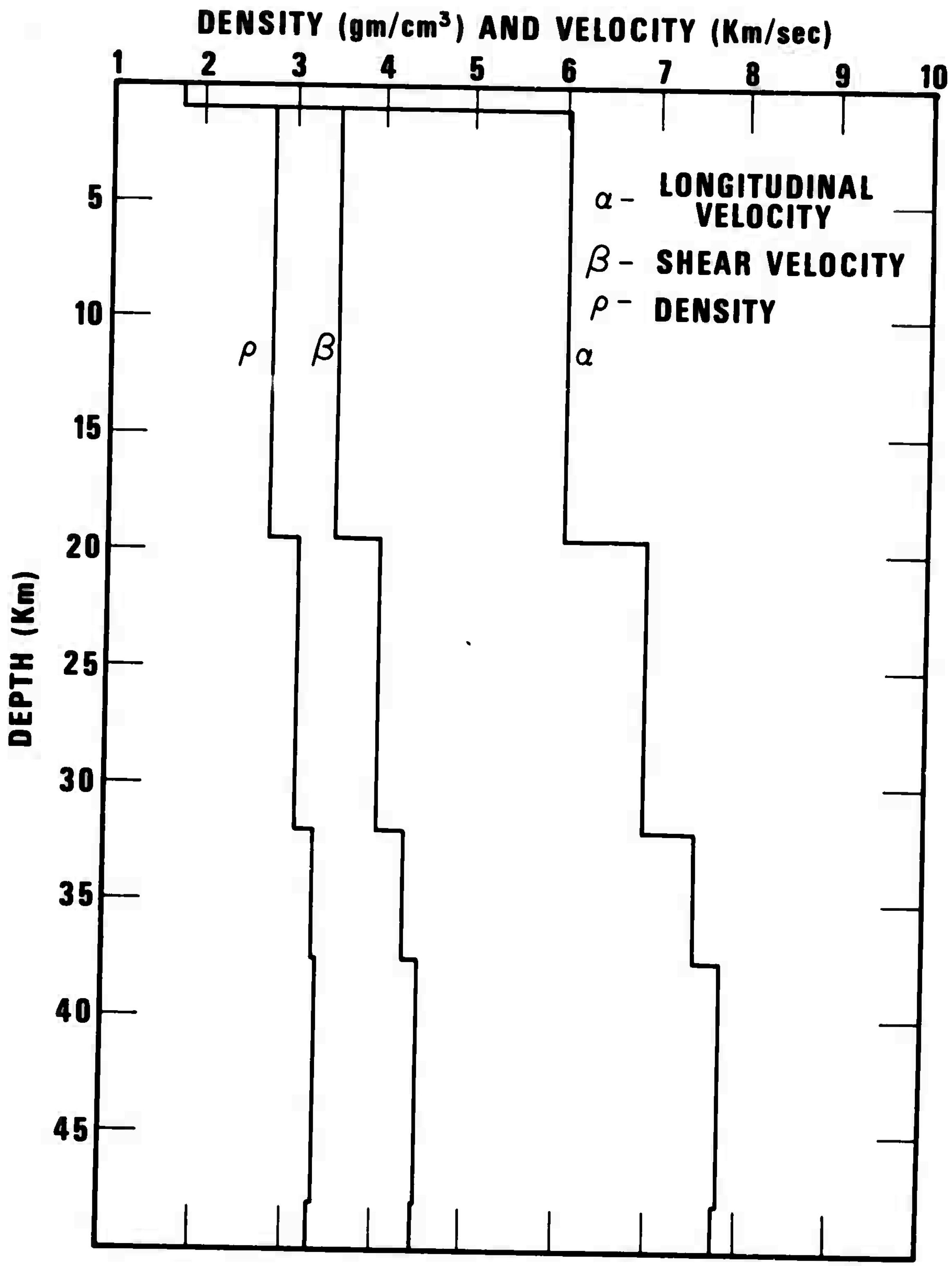


Figure 1. Basin and Range crustal model.

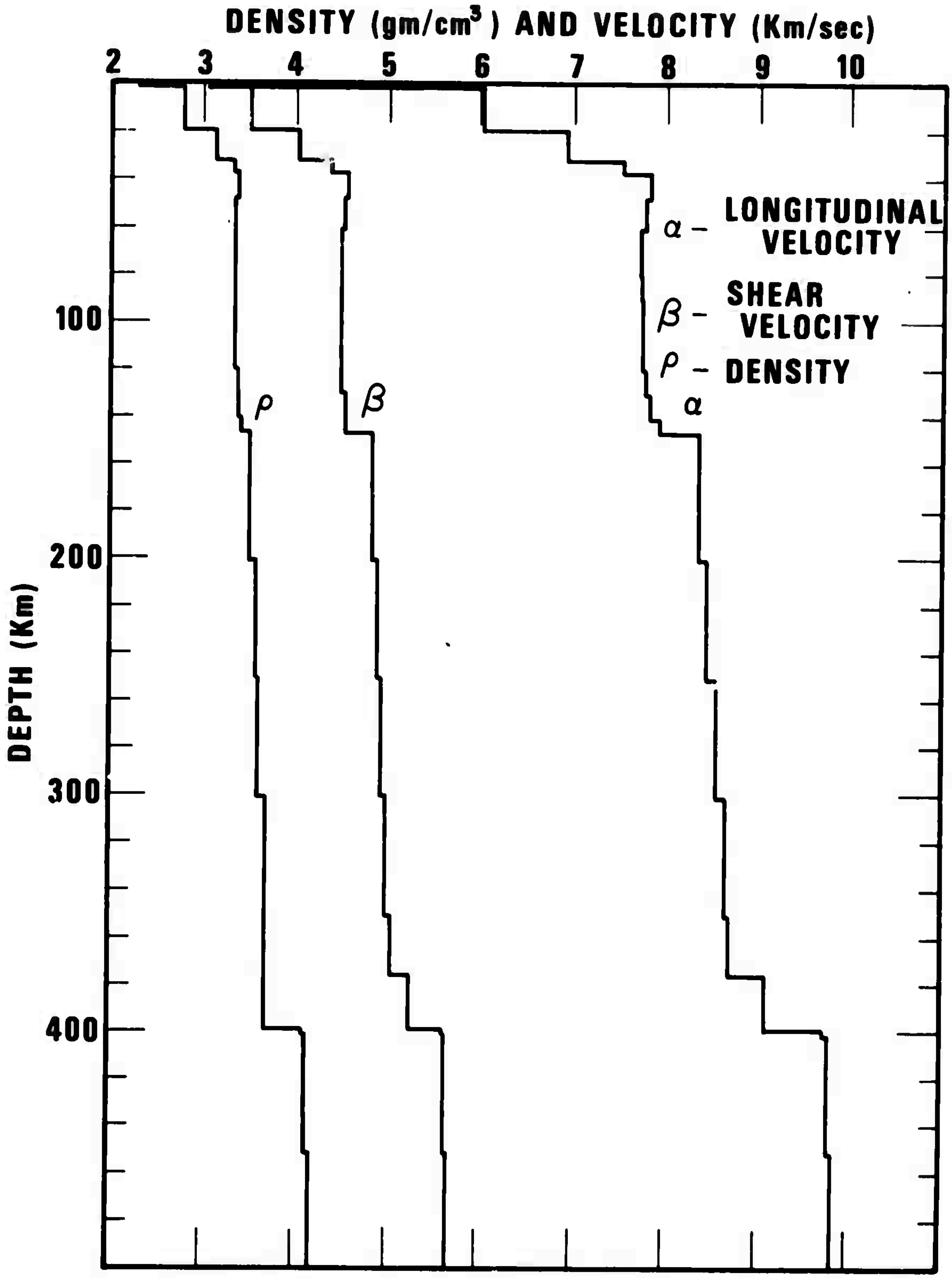


Figure 2. Basin and Range upper mantle model.

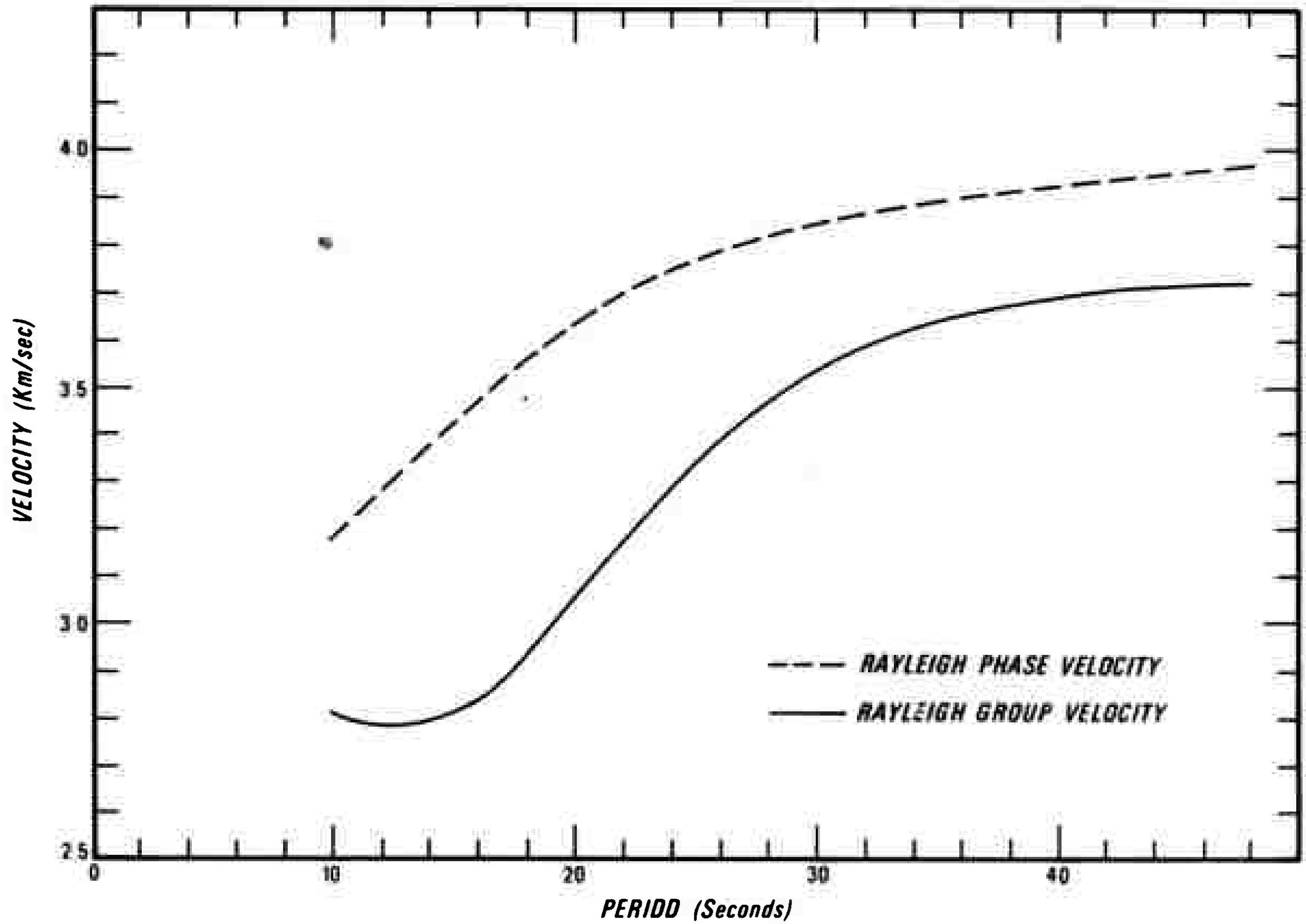


Figure 3. Fundamental mode Rayleigh wave dispersion for the Basin and Range model.

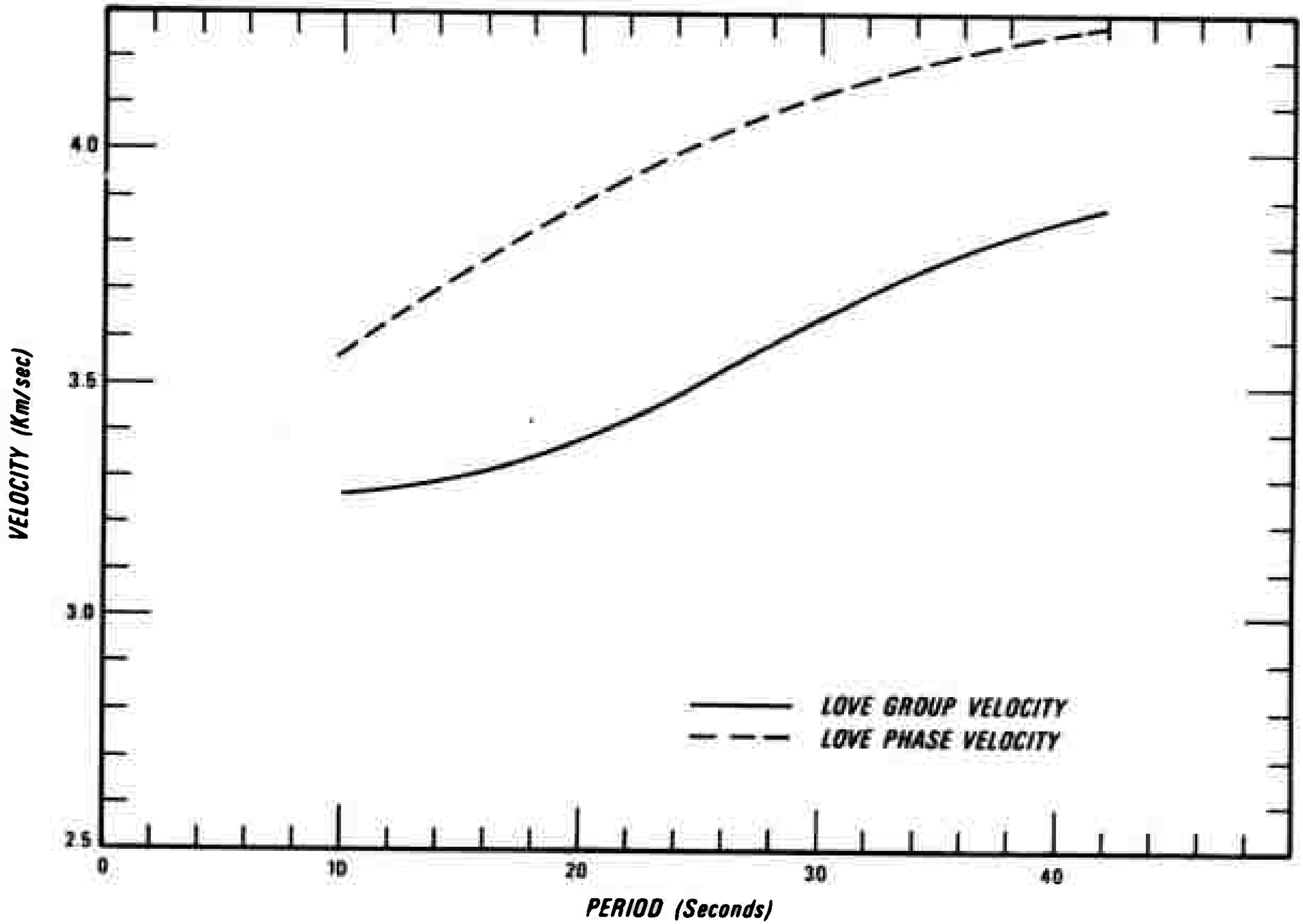


Figure 4. Fundamental mode Love wave dispersion for the Basin and Range model.

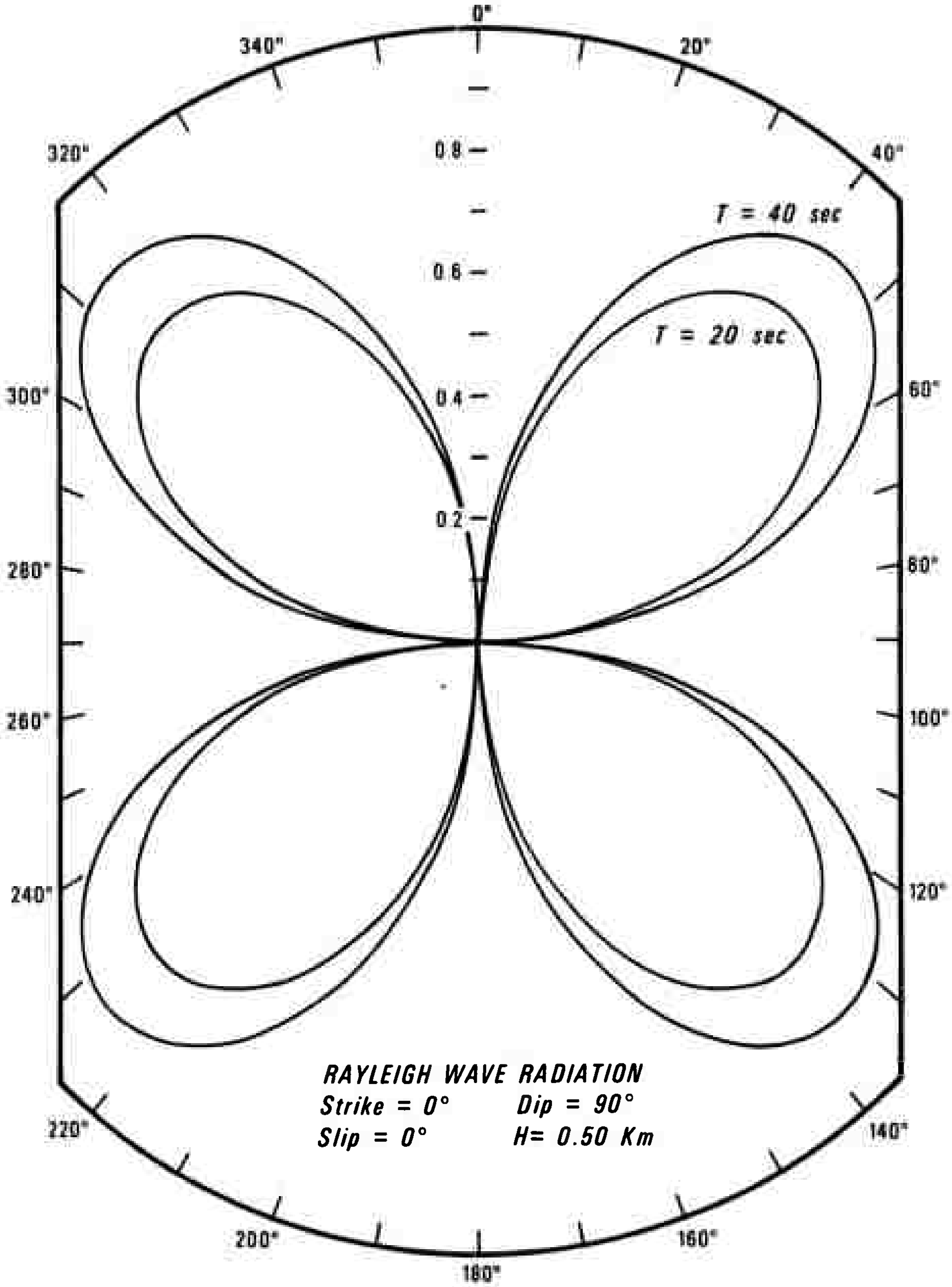


Figure 5. Rayleigh radiation pattern for a double couple representation of a left lateral vertical fault source at a depth of 0.5 km and with a strike of 0° and a slip of 0°.

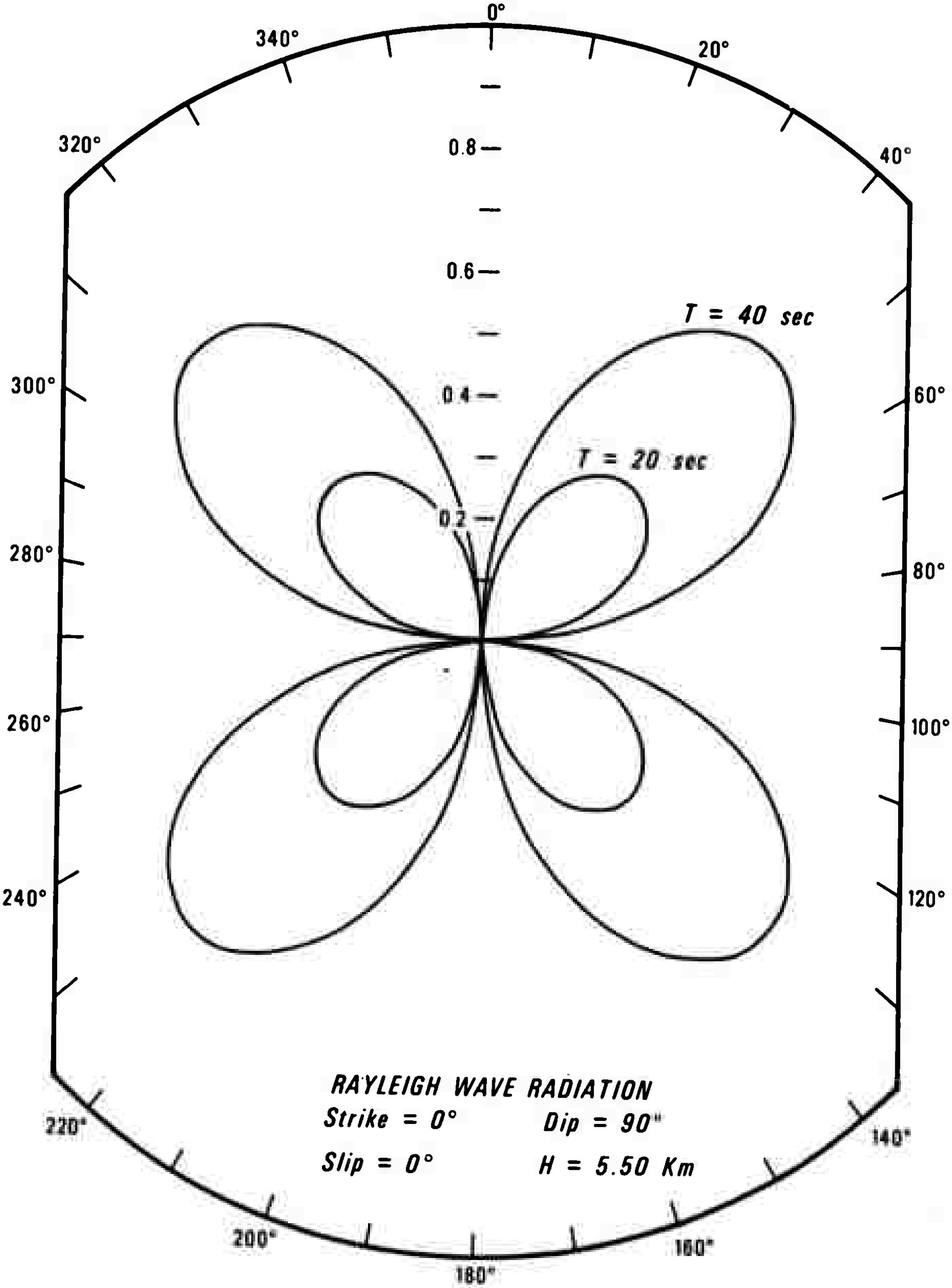


Figure 6. Rayleigh radiation pattern for a double couple representation of a left lateral vertical fault source at a depth of 5.5 km and with a strike of 0° and a slip of 0°.

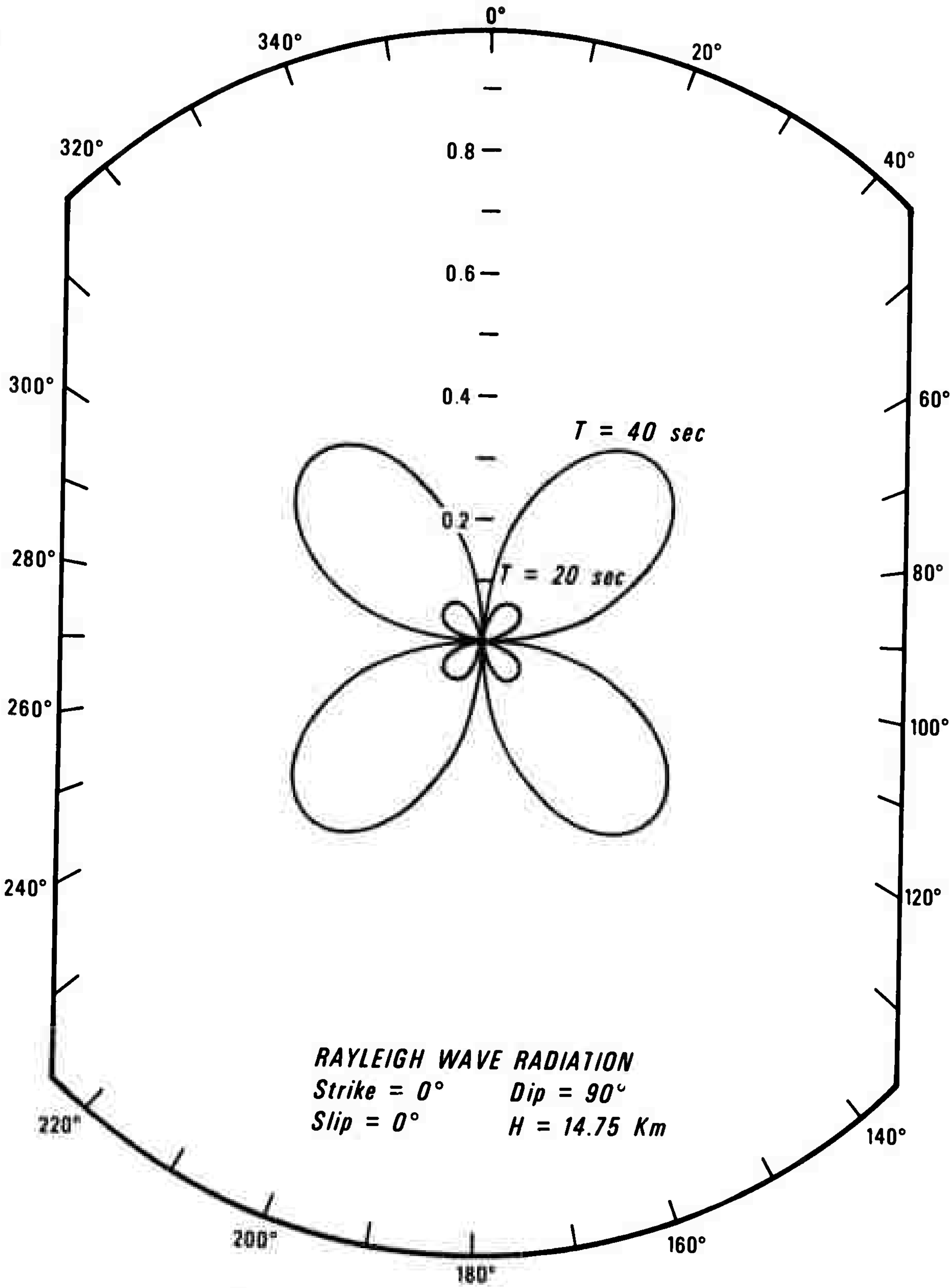
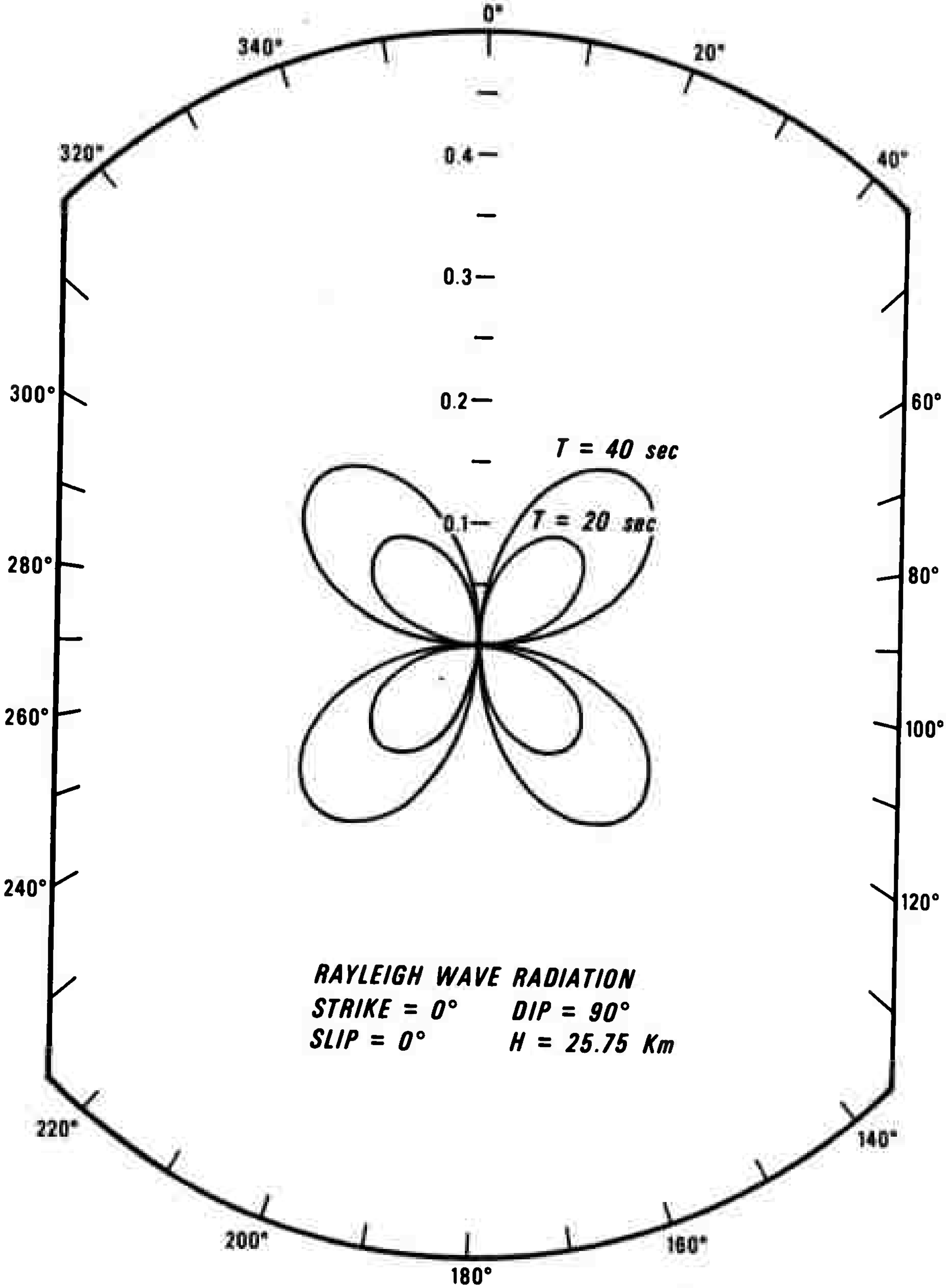


Figure 7. Rayleigh radiation pattern for a double couple representation of a left lateral vertical fault source at a depth of 14.75 km and with a strike of 0° and a slip of 0°.



.igure 8. Rayleigh radiation pattern for a double couple representation of a left lateral vertical fault source at a depth of 25.75 km and with a strike of 0° and a slip of 0°.

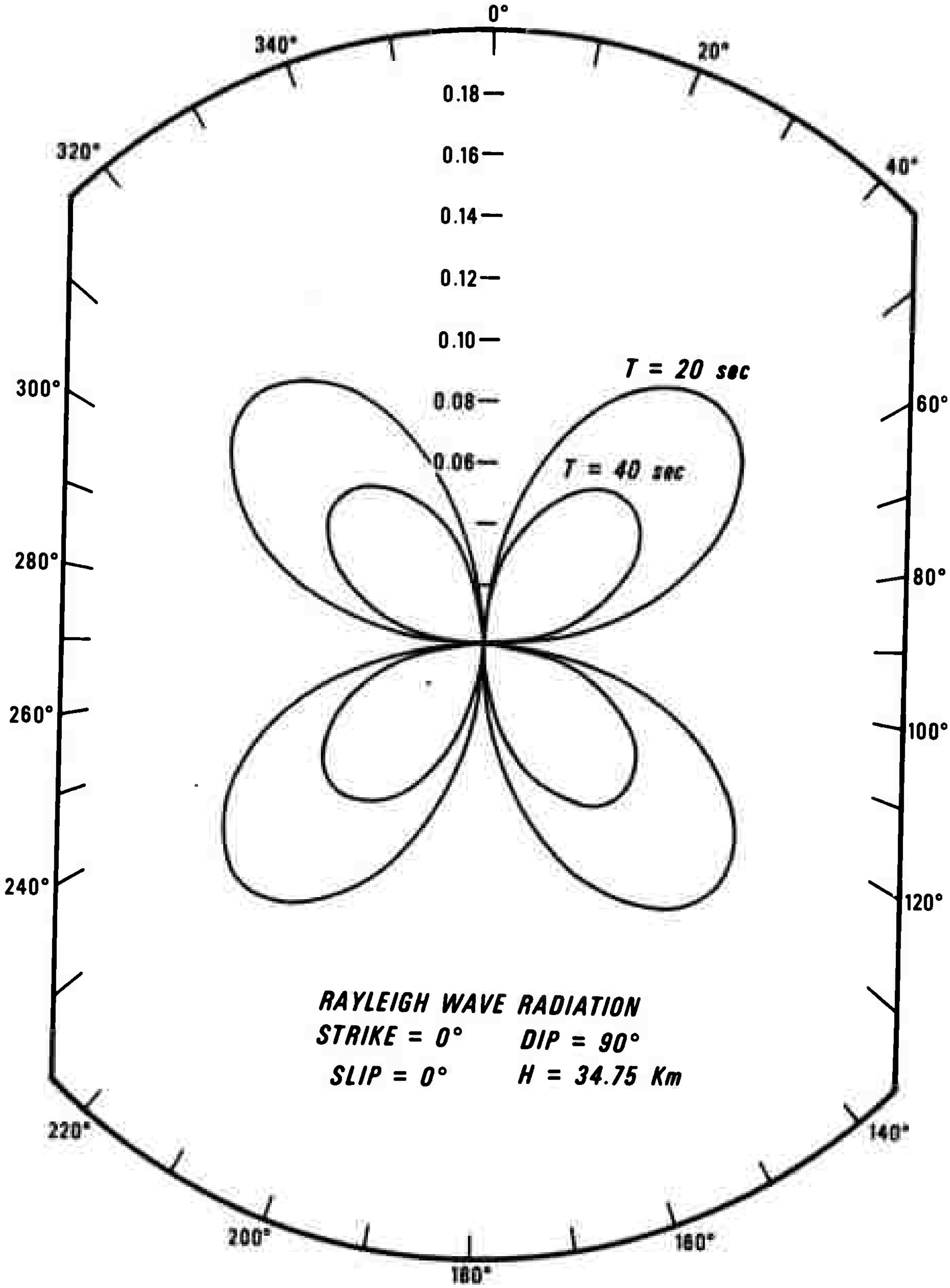


Figure 9. Rayleigh radiation pattern for a double couple representation of a left lateral vertical fault source at a depth of 34.75 km and with a strike of 0° and a slip of 0°.

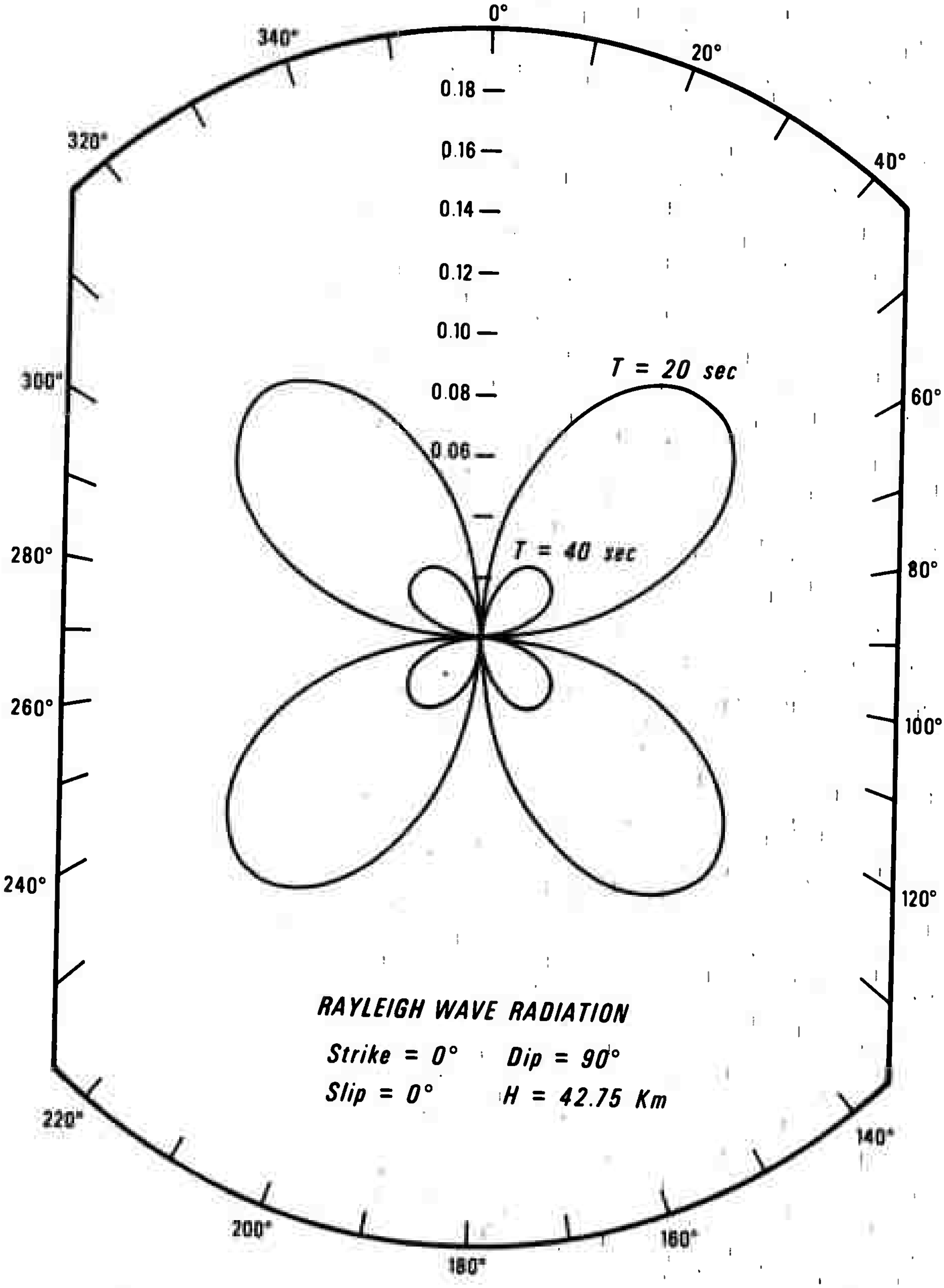


Figure 10. Rayleigh radiation pattern for a double couple representation of a left lateral vertical fault source at a depth of 42.75 km and with a strike of 0° and a slip of 0°.

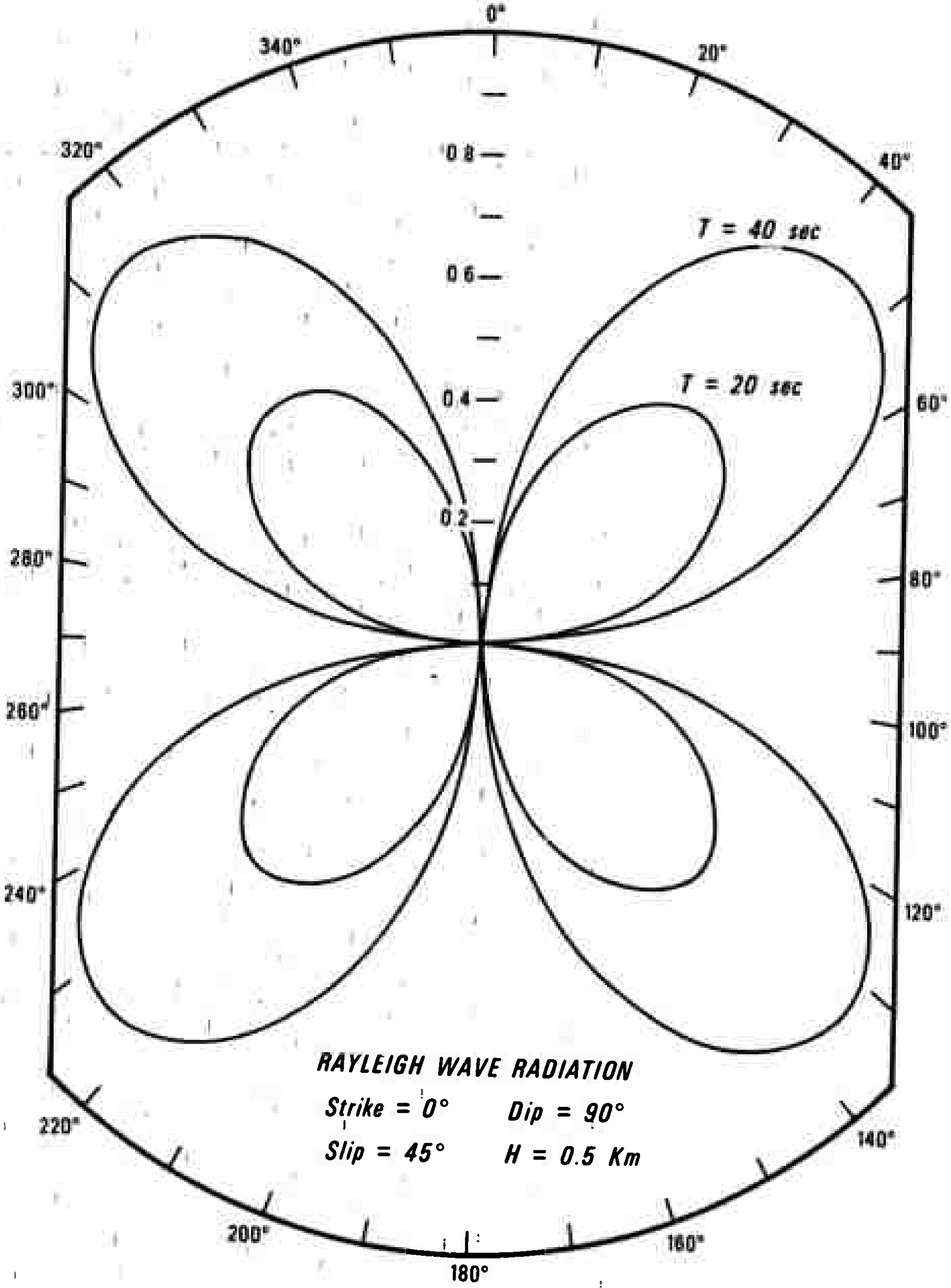


Figure 11. Rayleigh radiation pattern for a double couple representation of a left lateral vertical fault source at a depth of 0.5 km and with a strike of 0° and a slip of 45°.

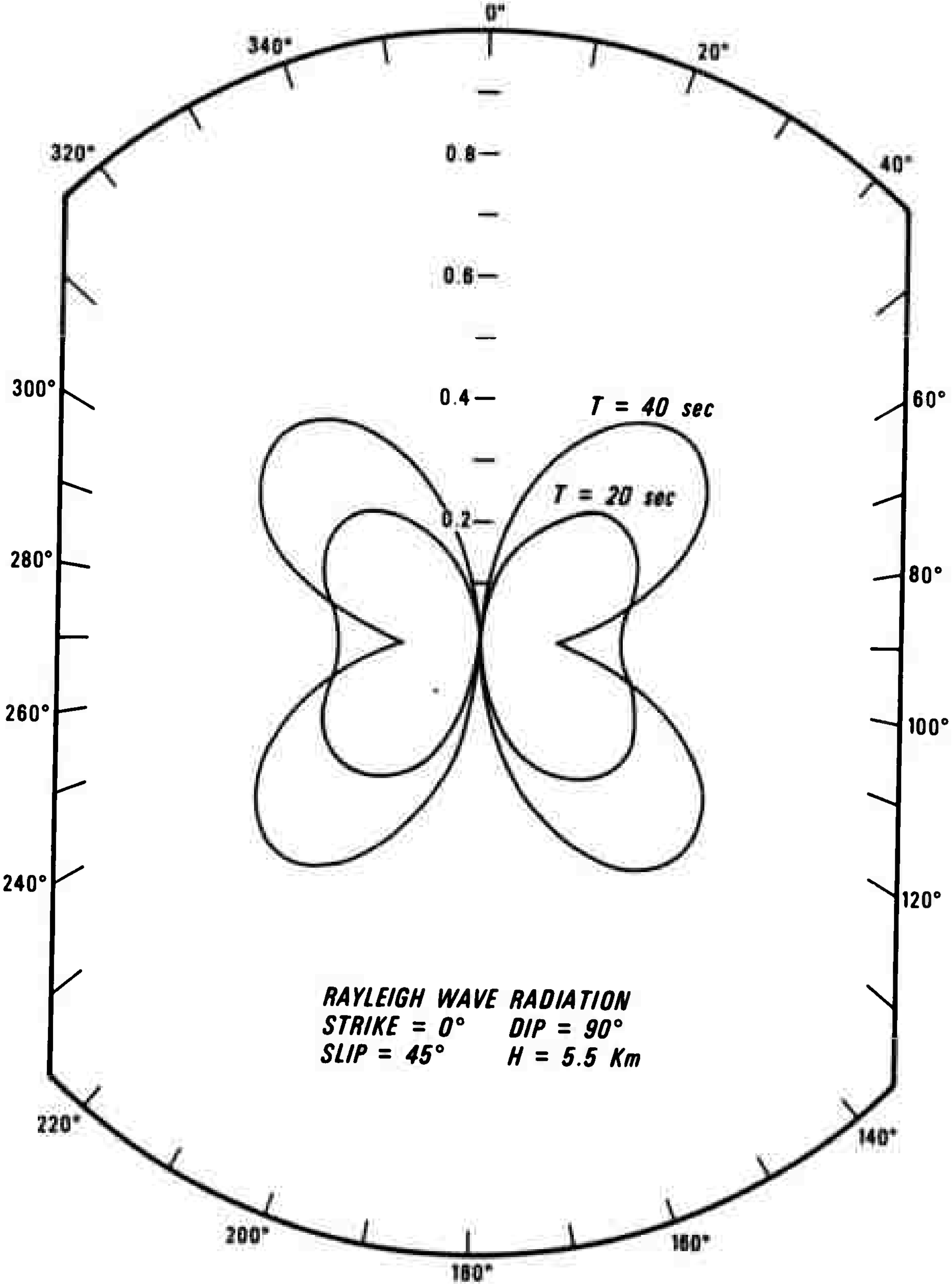


Figure 12. Rayleigh radiation pattern for a double couple representation of a left lateral vertical fault source at a depth of 5.5 km and with a strike of 0° and a slip of 45°.

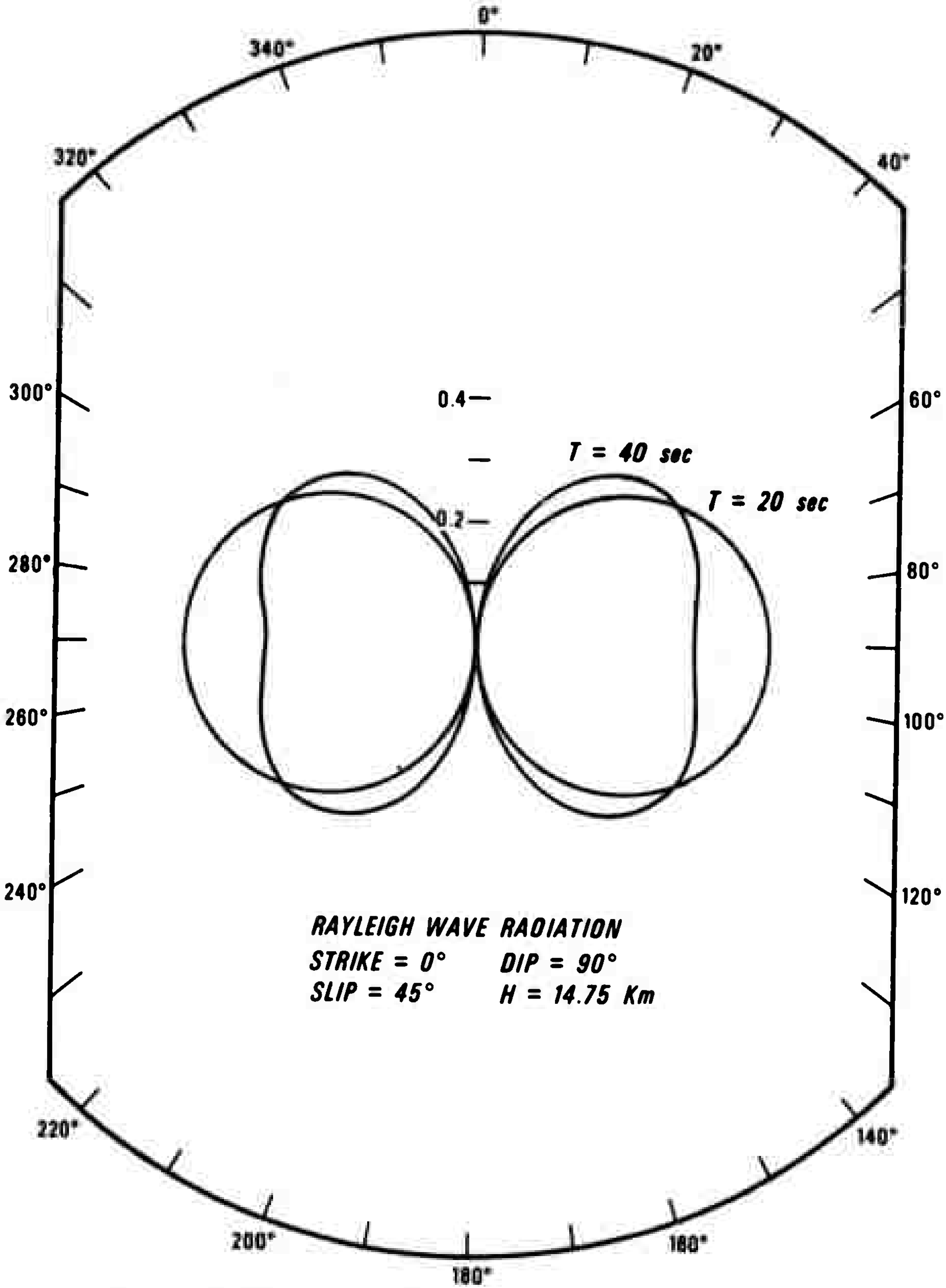


Figure 13. Rayleigh radiation pattern for a double couple representation of a left lateral vertical fault source at a depth of 14.75 km and with a strike of 0° and a slip of 45°.

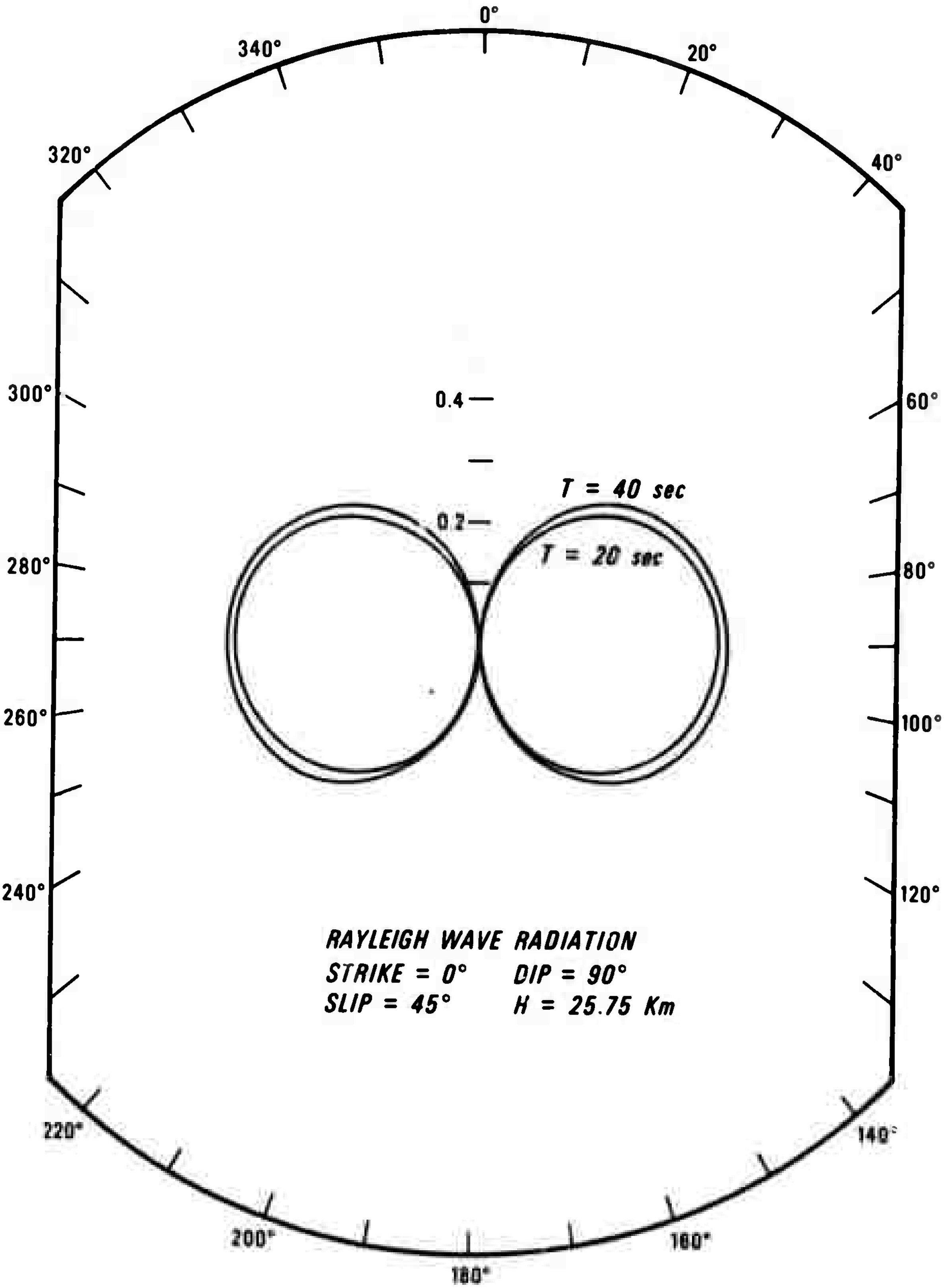


Figure 14. Rayleigh radiation pattern for a double couple representation of a left lateral vertical fault source at a depth of 25.75 km and with a strike of 0° and a slip of 45°.

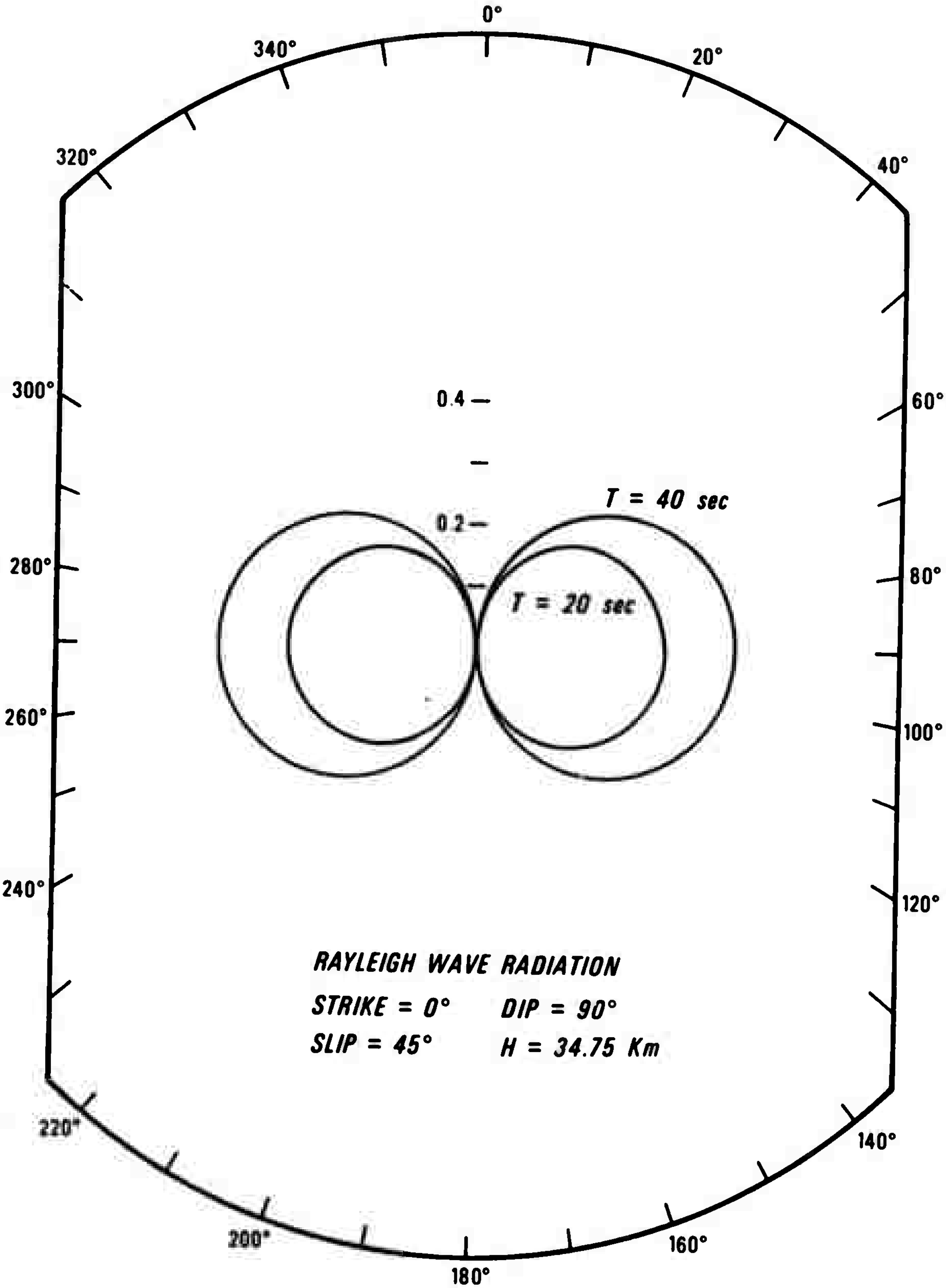


Figure 15. Rayleigh radiation pattern for a double couple representation of a left lateral vertical fault source at a depth of 34.75 km and with a strike of 0° and a slip of 45°.

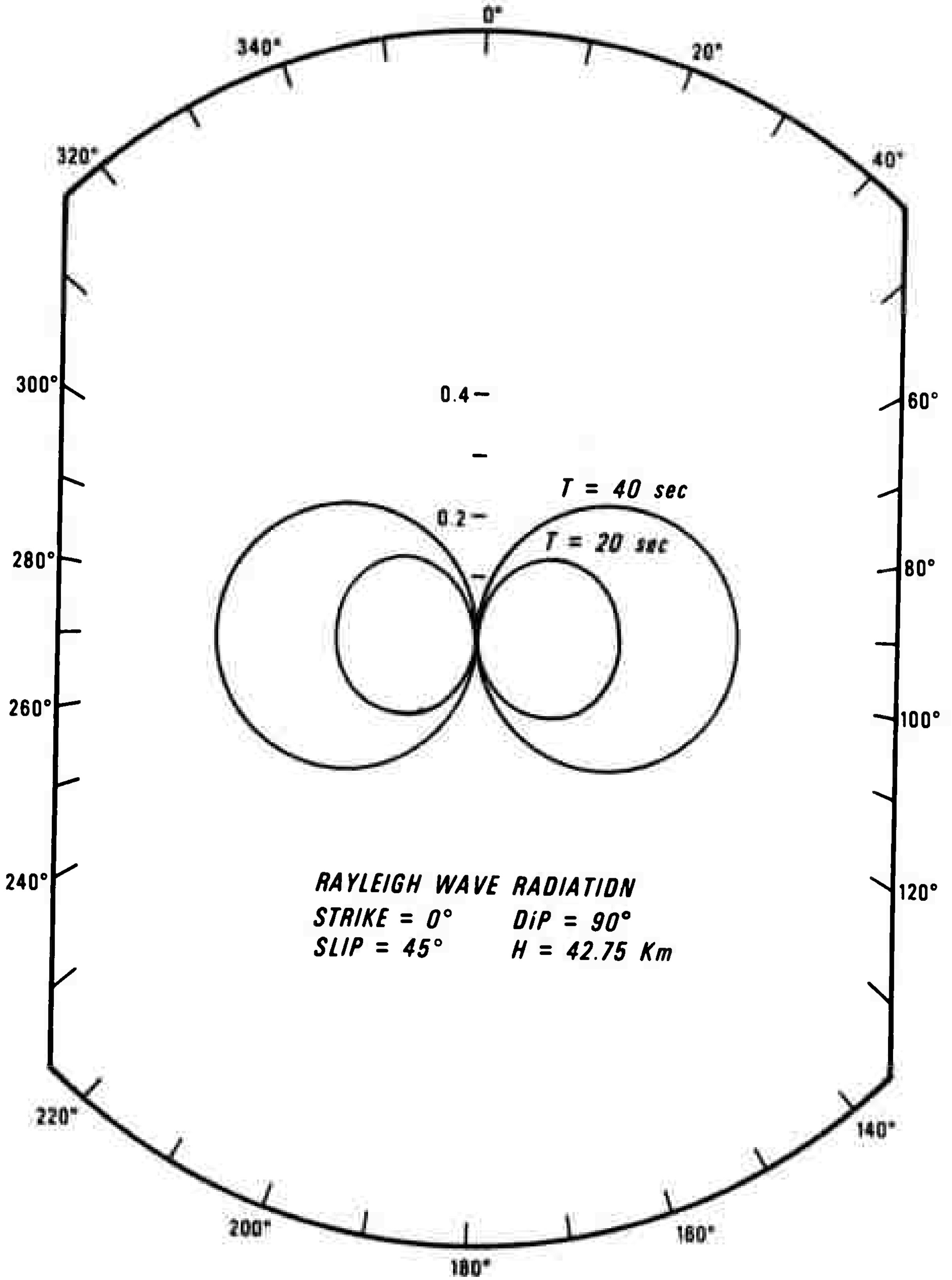


Figure 16. Rayleigh radiation pattern for a double couple representation of a left lateral vertical fault source at a depth of 42.75 km and with a strike of 0° and a slip of 45°.

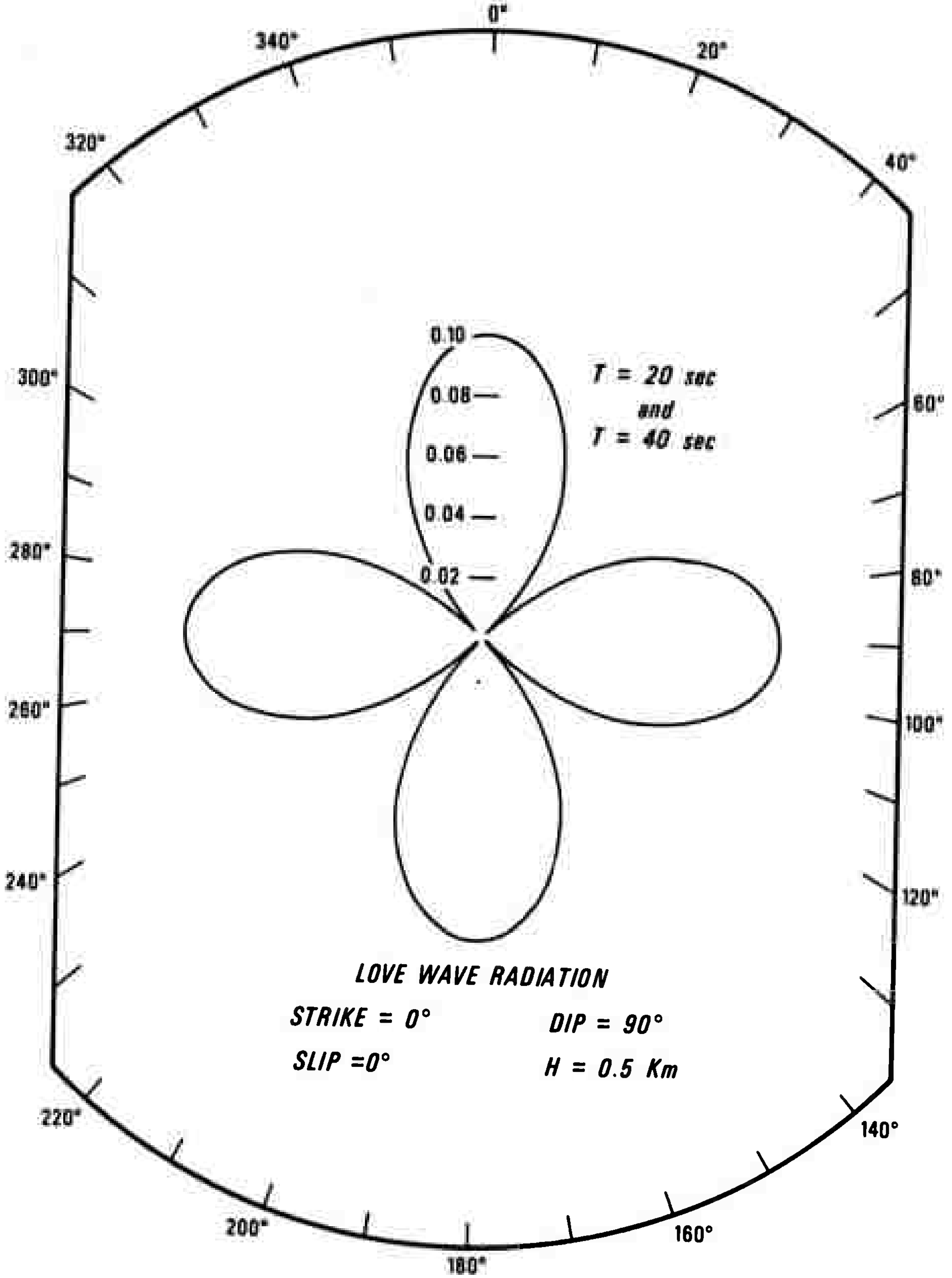


Figure 17. Love radiation pattern for a double couple representation of a left lateral vertical fault source at a depth of 0.5 km and with a strike of 0° and a slip of 0°.

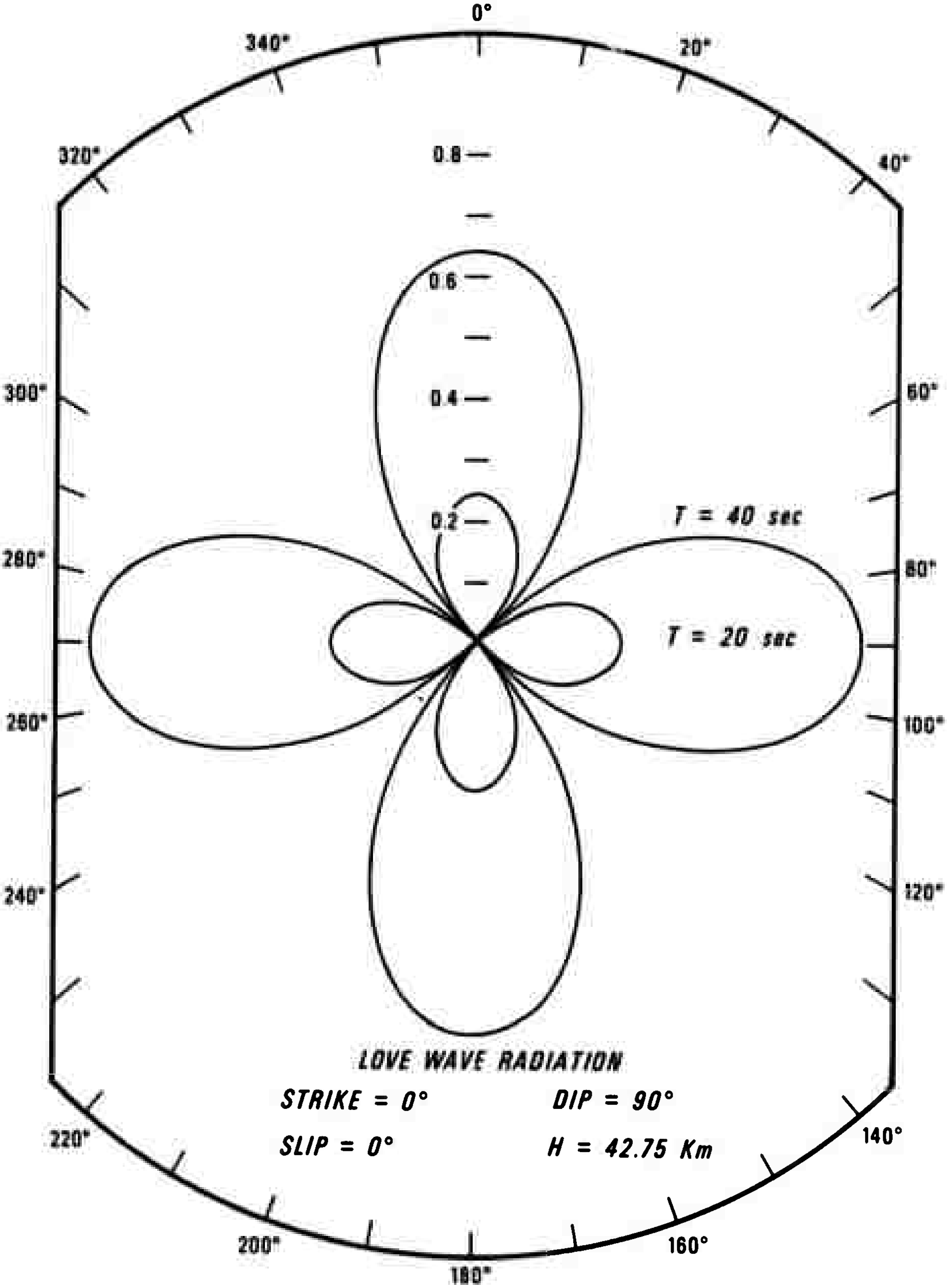


Figure 18. Love radiation pattern for a double couple representation of a left lateral vertical fault source at a depth of 42.75 km and with a strike of 0° and a slip of 0°.

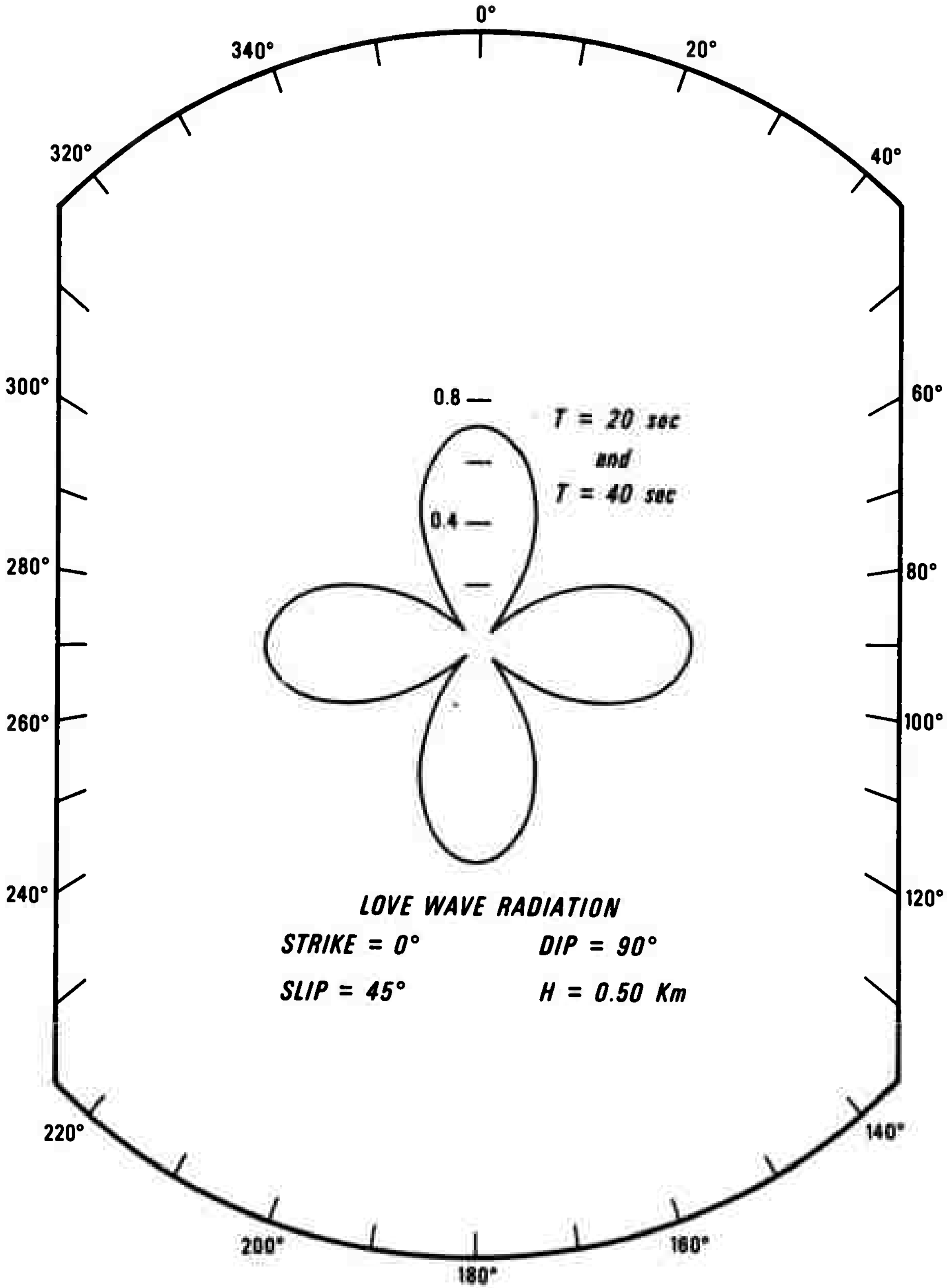


Figure 19. Love radiation pattern for a double couple representation of a left lateral vertical fault source at a depth of 0.5 km and with a strike of 0° and a slip of 45°.

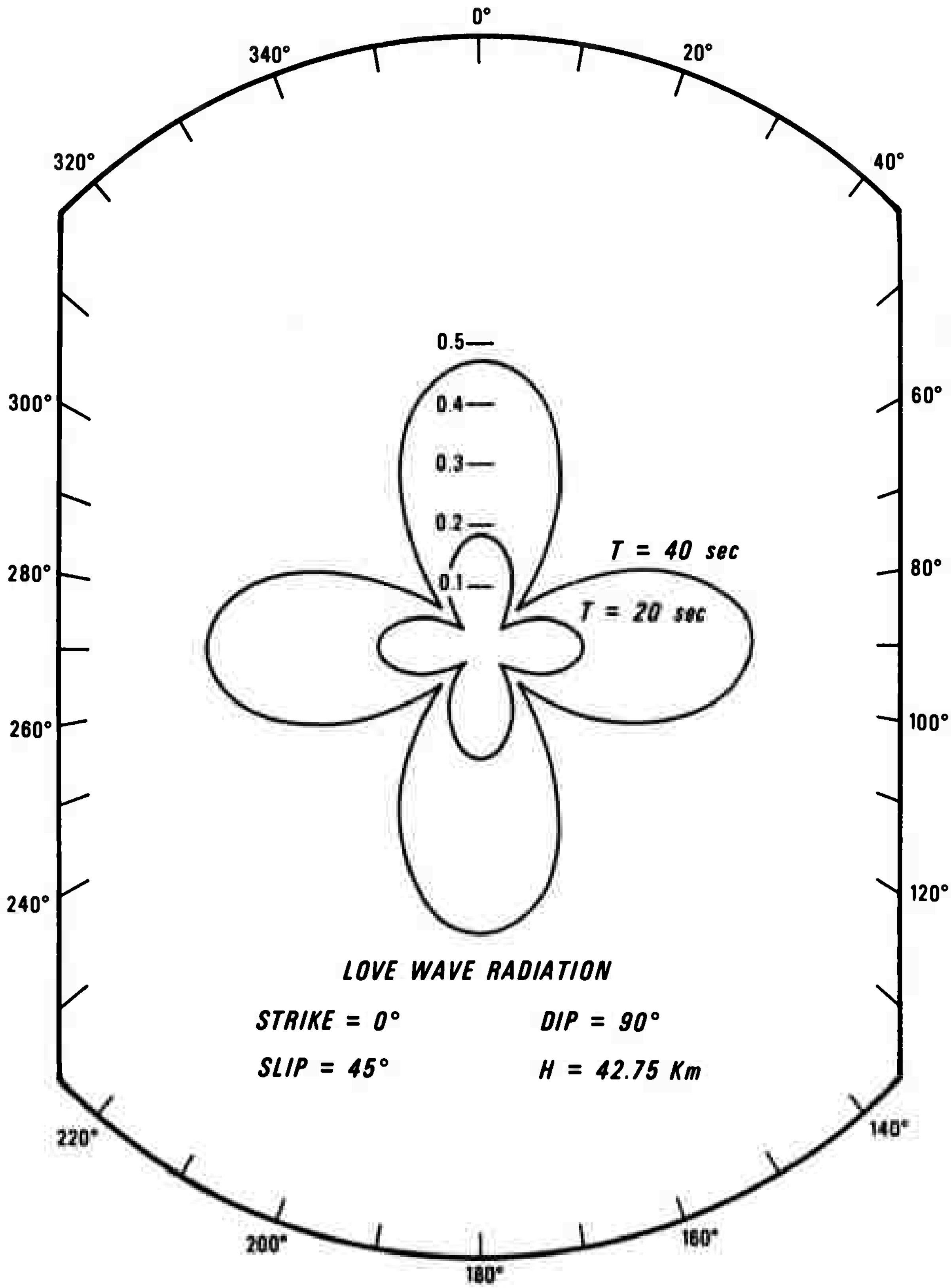


Figure 20. Love radiation pattern for a double couple representation of a left lateral vertical fault source at a depth of 42.75 km and with a strike of 0° and a slip of 45°.

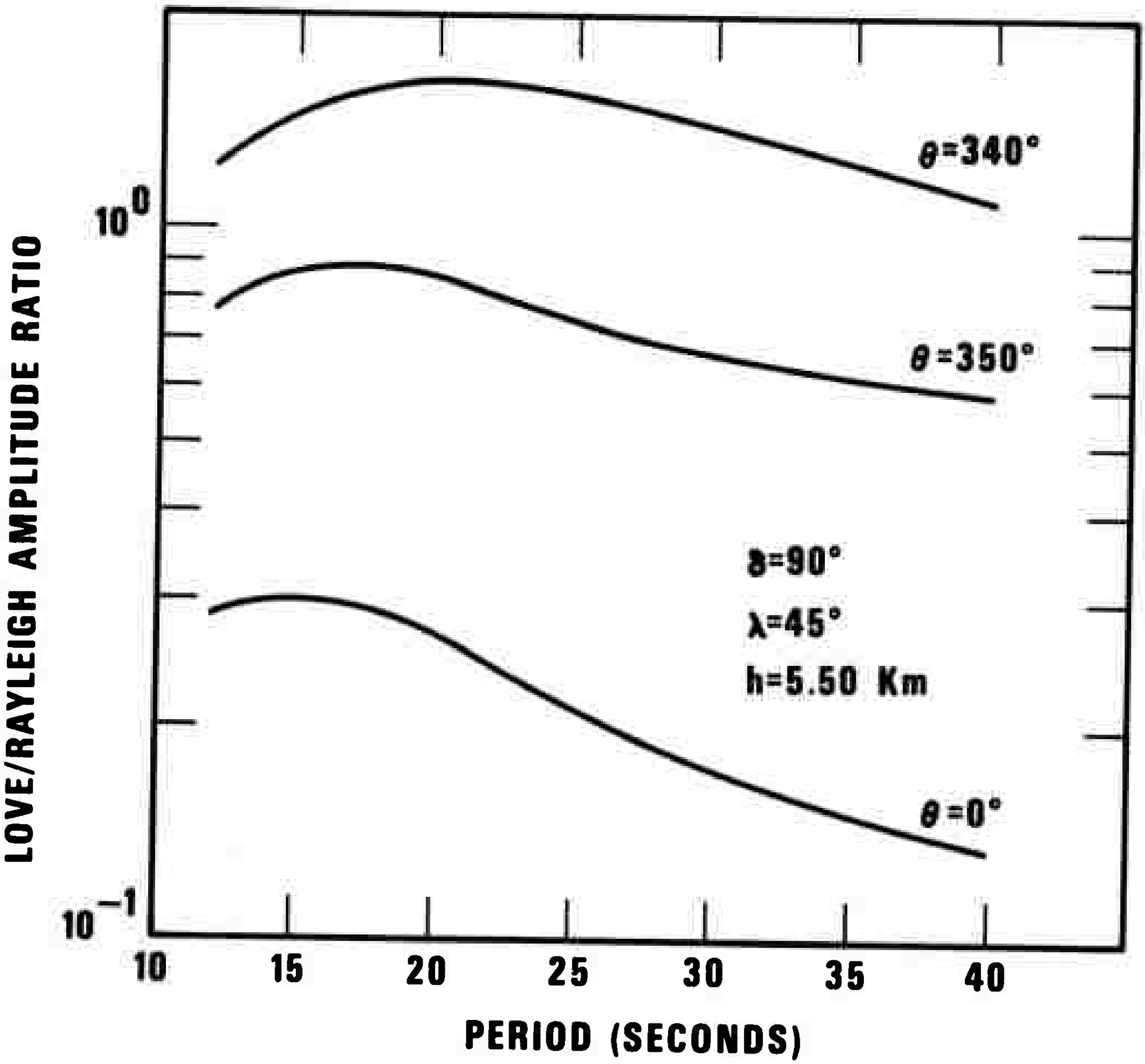


Figure 21. Love/Rayleigh amplitude ratio as a function of period and azimuth.

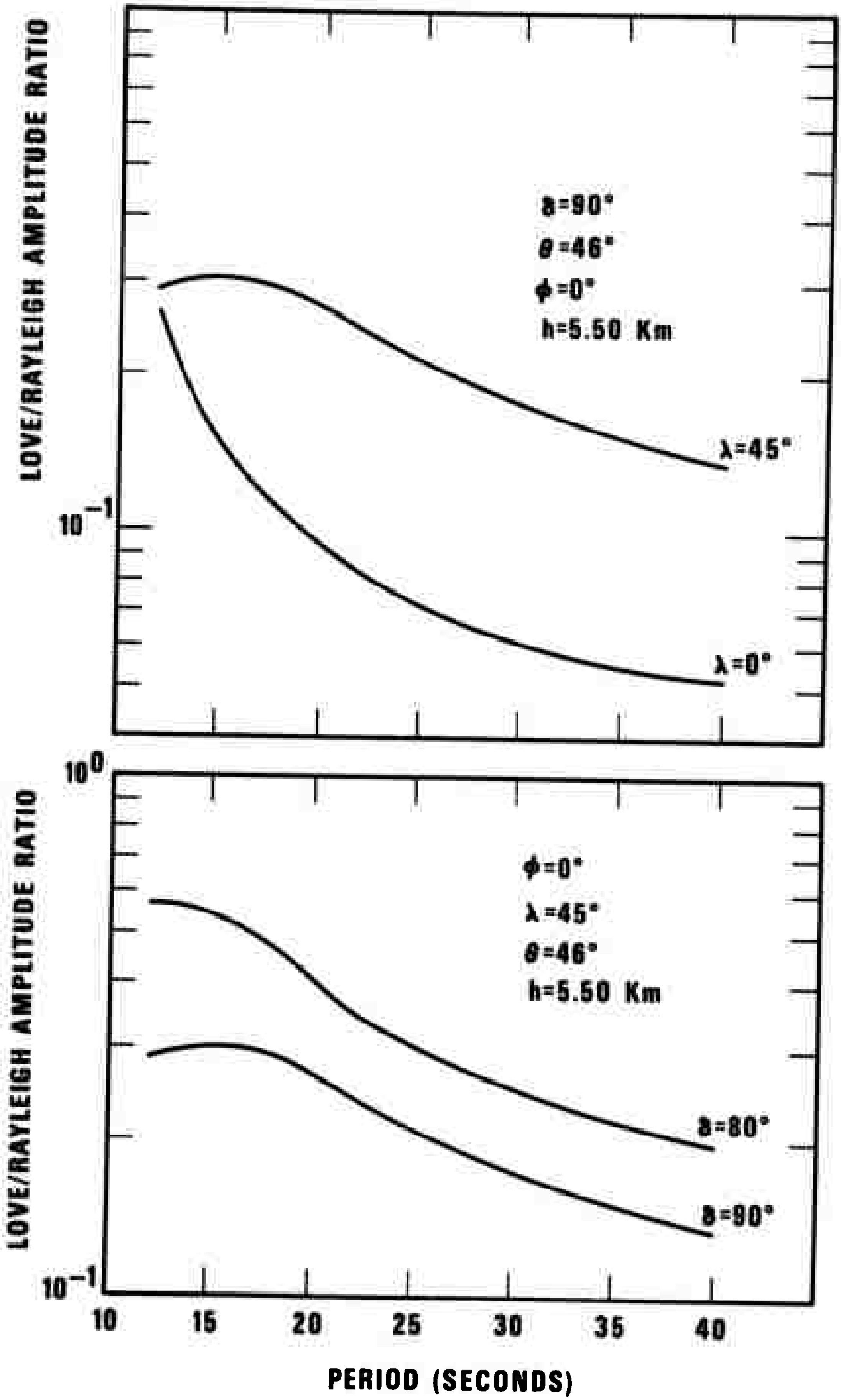


Figure 22. Love/Rayleigh amplitude ratio as a function of period, slip angle and dip angle.

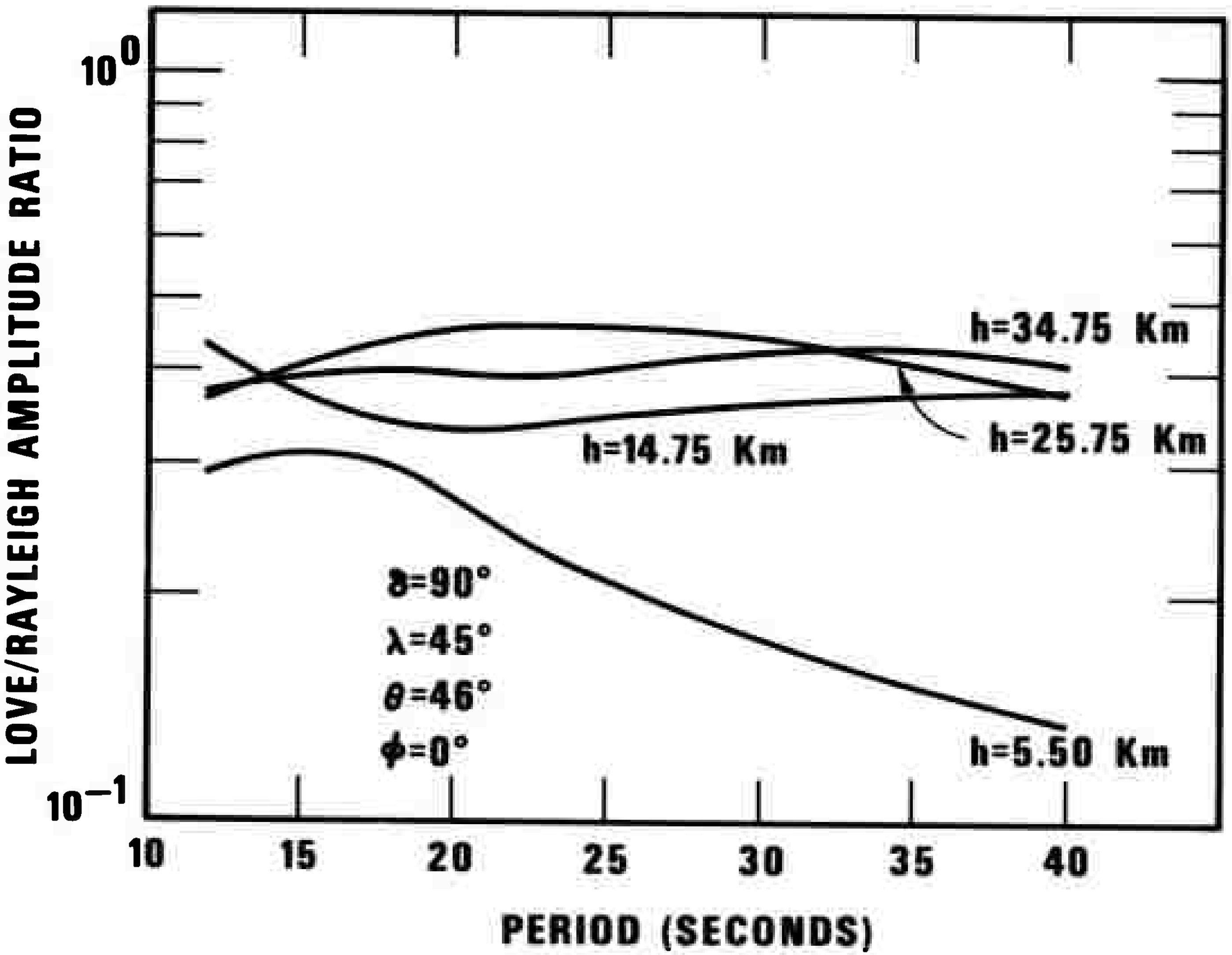


Figure 23. Love/Rayleigh amplitude ratio as a function of period and depth.

TABLE I
Radiation Pattern Coefficients

Coefficient	Point Force: Love	Point Force: Rayleigh
d_0	0	$\sin\lambda \sin\delta W(h)$
d_1	$\cos\lambda V(h)$	$-\sin\lambda \cos\delta A(h)$
d_2	$-\sin\lambda \cos\delta V(h)$	$-\cos\lambda A(h)$
d_3	0	0
d_4	0	0

Coefficient	Couple: Love	Couple: Rayleigh
d_0	$-\frac{1}{2}\cos\lambda \sin\delta V(h)$	$\frac{1}{2}\sin\lambda \sin 2\delta B(h)$
d_1	$\cos\lambda \cos\delta G(h)$	$\sin\lambda (W(h) - \cos^2\delta C(h)]$
d_2	$-\sin\lambda \cos^2\delta G(h)$	$\cos\lambda \cos\delta (W(h) - C(h)]$
d_3	$\frac{1}{2}\sin\lambda \sin 2\delta V(h)$	$\frac{1}{2}\cos\lambda \sin\delta A(h)$
d_4	$\frac{1}{2}\cos\lambda \sin\delta V(h)$	$-\frac{1}{2}\sin\lambda \sin 2\delta A(h)$

Coefficient	Double Couple: Love	Double Couple: Rayleigh
d_0	0	$\frac{1}{2}\sin\lambda \sin 2\delta B(h)$
d_1	$\cos\lambda \cos\delta G(h)$	$-\sin\lambda \cos 2\delta C(h)$
d_2	$-\sin\lambda \cos 2\delta G(h)$	$-\cos\lambda \cos\delta C(h)$
d_3	$\frac{1}{2}\sin\lambda \sin 2\delta V(h)$	$\cos\lambda \sin\delta A(h)$
d_4	$\cos\lambda \sin\delta V(h)$	$-\frac{1}{2}\sin\lambda \sin 2\delta A(h)$

The factors W(h), A(h), C(h), B(h), V(h) and G(h) in terms of the Thomson-Haskell displacement-stress vector elements (Haskell, 1953) are:

$$W(h) = [\dot{w}_S(h)/\dot{w}_0]$$

$$A(h) = -[\dot{u}_S{}^*(h)/\dot{w}_0]$$

$$C(h) = -\frac{1}{\mu_S}[\tau_{RS}(h)/(\dot{w}_o/C_R)]$$

$$B(h) = -\{(3 - 4\frac{\beta_S^2}{\alpha_S^2})[\dot{u}_s{}^*(h)/\dot{w}_0] + \frac{2}{\rho_S\alpha_S^2}[\sigma^*_{RS}(h)/(\dot{w}_0/C_R)]\}$$

$$V(h) = [\dot{v}_S(h)/\dot{v}_0]$$

and

$$G(h) = \frac{1}{\mu_S}[\tau^*_{LS}(h)/(\dot{v}_0/C_L)].$$

TABLE II

BASIN AND RANGE MODEL

Layer Thickness	P Velocity	S Velocity	Density
1.0	3.000	1.732	2.250
9.0	6.010	3.470	2.750
9.5	6.011	3.471	2.751
12.5	6.910	3.980	3.100
5.5	7.490	4.320	3.300
10.5	7.800	4.500	3.350
13.0	7.750	4.470	3.320
20.0	7.715	4.451	3.321
10.0	7.719	4.450	3.322
30.0	7.725	4.460	3.323
10.0	7.740	4.470	3.350
10.0	7.800	4.500	3.370
6.0	7.900	4.510	3.390
2.0	8.325	4.810	3.500
22.0	8.335	4.811	3.501
10.0	8.340	4.820	3.510
20.0	8.360	4.825	3.511
50.0	8.435	4.870	3.575
50.0	8.530	4.920	3.600
50.0	8.630	4.980	3.700
25.0	8.730	5.040	3.710
23.0	9.100	5.250	3.720
2.0	9.750	5.630	4.130
50.0	9.800	5.650	4.150
50.0	9.850	5.680	4.200
50.0	9.900	5.710	4.250
50.0	9.950	5.740	4.260
30.0	10.000	5.770	4.270
15.0	10.430	6.025	4.350
15.0	10.930	6.310	4.550
20.0	10.940	6.320	4.600
20.0	10.960	6.321	4.610
20.0	10.970	6.330	4.620
20.0	11.000	6.350	4.630
20.0	11.030	6.365	4.640
20.0	11.055	6.375	4.650
20.0	11.085	6.390	4.690
40.0	11.130	6.425	4.700
20.0	11.145	6.430	4.710
20.0	11.160	6.435	4.720
20.0	11.170	6.440	4.730
	11.200	6.460	4.750

TABLE III

DR(h,β)

T = 12 sec STRIKE = 0° DIP = 90° SLIP = 0°

θ	∂J/∂h Layer 1 to 2 ∂J/∂β of Layer 1	∂J/∂h Layer 1 to 2 ∂J/∂β of Layer 2	∂J/∂h Layer 2 to 3 ∂J/∂β of Layer 2	δJ/∂h Layer 2 to 3 δJ/∂β of Layer 3	∂J/∂h Layer 3 to 4 ∂J/∂β of Layer 3
10.00	-9.6514	-.07110	.02670	-.2520	-.03618
20.00	-9.3757	-.07134	.02676	-.2570	-.03690
30.00	-9.3119	-.07123	.02672	-.2573	-.03709
40.00	-9.4139	-.07130	.02675	-.2558	-.03687
44.00	-8.2707	-.07076	.02654	-.2598	-.03792
50.00	-9.4139	-.07130	.02675	-.2558	-.03687
60.00	-9.3145	-.07124	.02672	-.2559	-.03677
70.00	-9.3757	-.07134	.02676	-.2570	-.03690
80.00	-9.6514	-.07110	.02670	-.2520	-.03618
90.00	.0	.0	.0	.0	.0
100.00	-9.6514	-.07110	.02670	-.2520	-.03618
110.00	-9.3757	-.07134	.02676	-.2570	-.03690
120.00	-9.3119	-.07123	.02672	-.2573	-.03709
130.00	-9.4139	-.07130	.02675	-.2558	-.03687
134.00	-8.2707	-.07076	.02654	-.2598	-.03792
140.00	-9.4139	-.07130	.02675	-.2558	-.03687
150.00	-9.3145	-.07124	.02672	-.2559	-.03677
160.00	-9.3757	-.07134	.02676	-.2570	-.03690
170.00	-9.6514	-.07110	.02670	-.2520	-.03618
180.00	.0	.0	.0	.0	.0

θ	∂J/∂h Layer 3 to 4 ∂J/∂β of Layer 4	∂J/∂h Layer 4 to 5 ∂J/∂β of Layer 4	∂J/∂h Layer 4 to 5 ∂J/∂β of Layer 5	∂J/∂h Layer 5 to 6 ∂J/∂β of Layer 5	∂J/∂h Layer 5 to 6 ∂J/∂β of Layer 6
10.00	-.2057	.005975	.006652	.002853	.01845
20.00	-.2513	.009433	.008718	-.005852	-.00714
30.00	-.2343	.009325	.011283	-.007362	-.00961
40.00	-.2212	.008848	.010059	-.001836	-.00236
44.00	-.1404	.001230	.001204	-.005220	-.01537
50.00	-.2212	.008848	.010059	-.001836	-.00236
60.00	-.2502	.009190	.008773	-.002499	-.00716
70.00	-.2513	.009433	.008718	-.005852	-.00714
80.00	-.2057	.005975	.006652	.002853	.01845
90.00	.0	.0	.0	.0	.0
100.00	-.2057	.005975	.006652	.002853	.01845
110.00	-.2513	.009433	.008718	-.005852	-.00714
120.00	-.2343	.009325	.011283	-.007362	-.00961
130.00	-.2212	.008848	.010059	-.001836	-.00236
134.00	-.1404	.001230	.001204	-.005220	-.01537
140.00	-.2212	.008848	.010059	-.001836	-.00236
150.00	-.2502	.009199	.008773	-.002499	-.00716
160.00	-.2513	.009433	.008718	-.005852	-.00714
170.00	-.2057	.005975	.006652	.002853	.01845
180.00	.0	.0	.0	.0	.0

DR(h,β)

T = 16 sec   STRIKE = 0°   DIP = 90°   SLIP = 0°

θ	∂J/∂h Layer 1 to 2 ∂J/∂β Layer 1	∂J/∂h Layer 1 to 2 ∂J/∂β of Layer 2	∂J/∂h Layer 2 to 3 ∂J/∂β of Layer 3	∂J/∂h Layer 2 to 3 ∂J/∂β of Layer 3	∂J/∂h Layer 3 to 4 ∂J/∂β Layer 3
10.00	-7.3806	-.07652	-.03591	.03539	-.04372
20.00	-7.4046	-.07648	-.03592	.03509	-.04331
30.00	-7.2791	-.07638	-.93583	.03498	-.04320
40.00	-7.1097	-.07623	-.03574	.03502	-.04329
44.00	-6.3600	-.07732	-.03634	.03469	-.04261
50.00	-7.1097	-.07623	-.03574	.03502	-.04329
60.00	-6.9903	-.07637	-.03583	.03498	-.04318
70.00	-7.4046	-.07648	-.03592	.03509	-.04331
80.00	-7.3806	-.07652	-.03591	.03539	-.04372
90.00	.0	.0	.0	.0	.0
100.00	-7.3806	-.07652	-.03591	.03539	-.04372
110.00	-7.4046	-.07648	-.03592	.03509	-.04331
120.00	-7.2791	-.07638	-.03583	.03498	-.04320
130.00	-7.1097	-.07623	-.03574	.03502	-.04329
134.00	-6.3600	-.07732	-.03634	.03469	-.04261
140.00	-7.1097	-.07623	-.03574	.03502	-.04329
150.00	-6.9903	-.07637	-.03583	.03498	-.04318
160.00	-7.4046	-.07648	-.03592	.03509	-.04331
170.00	-7.3806	-.07652	-.03591	.03539	-.04372
180.00	.0	.0	.0	.0	.0

θ	∂J/∂h Layer 3 to 4 ∂J/∂β of Layer 4	∂J/∂h Layer 4 to 5 ∂J/∂β of Layer 4	∂J/∂h Layer 4 to 5 ∂J/∂β of Layer 5	∂J/∂h Layer 5 to 6 ∂J/∂β of Layer 5	∂J/∂h Layer 5 to 6 ∂J/∂β of Layer 6
10.00	-.1920	-.03007	-.1069	-.1046	-.3439
20.00	-.1913	-.02992	-.1056	-.1030	-.3940
30.00	-.1910	-.02983	-.1111	-.1092	-.3475
40.00	-.1916	-.02984	-.1091	-.1065	-.5092
44.00	-.1944	-.03027	-.1301	-.1380	-.4614
50.00	-.1916	-.02984	-.1091	-.1065	-.5092
60.00	-.1928	-.03023	-.1115	-.1092	-.2798
70.00	-.1913	-.02992	-.1056	-.1030	-.3940
80.00	-.1920	-.93007	-.1069	-.1046	-.3439
90.00	.0	.0	.0	.0	.0
100.00	-.1920	-.03007	-.1069	-.1046	-.3439
110.00	-.1913	-.02992	-.1056	-.1030	-.3940
120.00	-.1910	-.02983	-.1111	-.1092	-.3475
130.00	-.1916	-.02984	-.1091	-.1065	-.5092
134.00	-.1944	-.03027	-.1301	-.1380	-.4614
140.00	-.1916	-.02984	-.1091	-.1065	-.5092
150.00	-.1928	-.03023	-.1115	-.1092	-.2798
160.00	-.1913	-.02992	-.1056	-.1030	-.3940
170.00	-.1920	-.03007	-.1069	-.1046	-.3439
180.00	.0	.0	.0	.0	.0

DR(h,β)

T = 20 sec STRIKE = 0° DIP = 90° SLIP = 0°

θ	∂J/∂h Layer 1 to 2 ∂J/∂β of Layer 1	∂J/∂h Layer 1 to 2 ∂J/∂β of Layer 2	∂J/∂h Layer 2 to 3 ∂J/∂β of Layer 2	∂J/∂h Layer 2 to 3 ∂J/∂β of Layer 3	∂J/∂h Layer 3 to 4 ∂J/∂β of Layer 3
10.00	-5.9840	-.06504	-2.4824	.02374	-.01961
20.00	-5.6680	-.06495	-2.4678	.02604	-.02150
30.00	-5.9070	-.06495	-2.4934	.02602	-.02149
40.00	-5.1638	-.06504	-2.4769	.02525	-.02085
44.00	-5.0104	-.06478	-2.4740	.02575	-.02127
50.00	-5.1638	-.06504	-2.4769	.02525	-.02085
60.00	-5.9070	-.06495	-2.4935	.02605	-.02151
70.00	-5.6680	-.06495	-2.4678	.02604	-.02150
80.00	-5.9840	-.06504	-2.4824	.02374	-.01961
90.00	.0	.0	.0	.0	.0
100.00	-5.9840	-.06504	-2.4824	.02374	-.01961
110.00	-5.6680	-.06495	-2.4678	.02604	-.02150
120.00	-5.9070	-.06495	-2.4934	.02602	-.02149
130.00	-5.1638	-.06504	-2.4769	.02525	-.02085
134.00	-5.0104	-.06478	-2.4740	.02525	-.02127
140.00	-5.1638	-.06504	-2.4769	.02538	-.02085
150.00	-5.9070	-.06495	-2.4935	.02605	-.02151
160.00	-5.6680	-.06495	-2.4678	.02604	-.02150
170.00	-5.9840	-.06504	-2.4824	.02374	-.01961
180.00	.0	.0	.0	.0	.0

θ	∂J/∂h Layer 3 to 4 ∂J/∂β of Layer 4	∂J/∂h Layer 4 to 5 ∂J/∂β of Layer 4	∂J/∂h Layer 4 to 5 ∂J/∂β Layer 5	∂J/∂h Layer 5 to 6 ∂J/∂β of Layer 5	∂J/∂h Layer 5 to 6 ∂J/∂β of Layer 6
10.00	-1.4430	-.02531	-.1445	-.09747	-.2405
20.00	-1.4335	-.02518	-.1471	-.10007	-.2505
30.00	-1.4505	-.02529	-.1464	-.09960	-.2349
40.00	-1.4231	-.02489	-.1514	-.10407	-.2305
44.00	-1.4213	-.02485	-.1227	-.08207	-.3670
50.00	-1.4231	-.02489	-.1514	-.10407	-.2305
60.00	-1.4552	-.02537	-.1463	-.09951	-.2344
70.00	-1.4335	-.02518	-.1471	-.10007	-.2505
80.00	-1.4430	-.02531	-.1445	-.09747	-.2405
90.00	.0	.0	.0	.0	.0
100.00	-1.4430	-.02531	-.1445	-.09747	-.2405
110.00	-1.4335	-.02518	-.1471	-.10007	-.2505
120.00	-1.4505	-.02529	-.1464	-.09660	-.2349
130.00	-1.4231	-.02489	-.1514	-.10407	-.2305
134.00	-1.4213	-.02485	-.1227	-.08207	-.3670
140.00	-1.4231	-.02489	-.1514	-.10407	-.2305
150.00	-1.4552	-.02537	-.1463	-.09951	-.2344
160.00	-1.4335	-.02518	-.1471	-.10007	-.2505
170.00	-1.4430	-.02531	-.1445	-.99747	-.2405
180.00	.0	.0	.0	.0	.0

DR(h,β)

T = 30 sec   STRIKE = 0°   DIP = 90°   SLIP = 0°

θ	∂J/∂h Layer 1 to 2 ∂J/∂β of Layer 1	∂J/∂h Layer 1 to 2 ∂J/∂β of Layer 2	∂J/∂h Layer 2 to 3 ∂J/∂β of Layer 2	∂J/∂h Layer 2 to 3 ∂J/∂β of Layer 3	∂J/∂h Layer 3 to 4 ∂J/∂β of Layer 3
10.00	-3.9039	-.04671	-.08441	-.05052	-.2609
20.00	-4.3396	-.04673	-.08450	-.05045	-.2605
30.00	-4.4932	-.04676	-.08449	-.05066	-.2616
40.00	-3.8748	-.04667	-.08434	-.05050	-.2601
44.00	11.3437	-.94704	-.08501	-.05154	-.2655
50.00	-3.8748	-.04667	-.08434	-.05050	-.2601
60.00	-4.4901	-.04674	-.08449	-.05066	-.2617
70.00	-4.3396	-.04673	-.08450	-.05045	-.2605
80.00	-3.9039	-.04671	-.08441	-.05052	-.2609
90.00	.0	.0	.0	.0	.0
100.00	-3.9039	-.04671	-.08441	-.05052	-.2609
110.00	-4.3396	-.04673	-.08450	-.05045	-.2605
120.00	-4.4932	-.04676	-.08449	-.05066	-.2616
130.00	-3.8748	-.04667	-.08434	-.05050	-.2601
134.00	11.3437	-.04704	-.08501	-.05154	-.2655
140.00	-3.8748	-.04667	-.08434	-.05050	-.2601
150.00	-4.4901	-.04674	-.08449	-.05066	-.2617
160.00	-4.3396	-.04673	-.08450	-.05045	-.2605
170.00	-3.9039	-.04671	-.08441	-.05052	-.2609
180.00	.0	.0	.0	.0	.0

θ	∂J/∂h Layer 3 to 4 ∂J/∂β of Layer 4	∂J/∂h Layer 4 to 5 ∂J/∂β of Layer 4	∂J/∂h Layer 4 to 5 ∂J/∂β of Layer 5	∂J/∂h Layer 5 to 6 ∂J/∂β of Layer 5	∂J/∂h Layer 5 to 6 ∂J/∂β of Layer 6
10.00	-.03752	-.004499	.006206	-.07020	-.4621
20.00	-.03711	-.004390	.005953	-.06813	-.4694
30.00	-.03741	-.004419	.006010	-.06885	-.4742
40.00	-.03751	-.004548	.006129	-.06857	-.4735
44.00	-.03776	-.004505	.006041	-.06851	-.4801
50.00	-.03751	-.004548	.006129	-.06857	-.4735
60.00	-.03736	-.004418	.006035	-.06908	-.4708
70.00	-.03711	-.004390	.005953	-.06813	-.4694
80.00	-.03752	-.004499	.006206	-.07020	-.4621
90.00	.0	.0	.0	.0	.0
100.00	-.03752	-.004499	.006206	-.07020	-.4621
110.00	-.03711	-.004390	.005953	-.06813	-.4694
120.00	-.03741	-.004419	.006010	-.06885	-.4742
130.00	-.03751	-.004548	.006129	-.06857	-.4735
134.00	-.03776	-.004505	.006041	-.06851	-.4801
140.00	-.03751	-.004548	.006129	-.06857	-.4735
150.00	-.03736	-.004418	.006035	-.06908	-.4708
160.00	-.93711	-.004390	.005953	-.06813	-.4694
170.00	-.03752	-.004499	.006206	-.07020	-.4621
180.00	.0	.0	.0	.0	.0

DR(h,β)

T = 40 sec   STRIKE = 0°   DIP = 90°   SLIP = 0°

θ	∂J/∂h Layer 1 to 2 ∂J/∂β of Layer 1	∂J/∂h Layer 1 to 2 ∂J/∂β of Layer 2	∂J/∂h Layer 2 to 3 ∂J/∂β of Layer 2	∂J/∂h Layer 2 to 3 ∂J/∂β of Layer 3	∂J/∂h Layer 3 to 4 ∂J/∂β of Layer 3
10.00	-5.4639	-.04658	-.06326	-.05074	-.1059
20.00	-4.5210	-.04639	-.06294	-.05114	-.1069
30.00	-4.8319	-.04659	-.06330	-.05104	-.1064
40.00	-4.2014	-.04664	.06343	-.05103	-.1066
44.00	-4.0110	-.04698	-.06433'	-.05024	-.1045
50.00	-4.2014	-.04664	-.06343	-.05103	-.1066
60.00	-4.8318	-.04649	-.06313	-.05102	-.1064
70.00	-4.5210	-.04639	-.06294	-.05114	-.1069
80.00	-5.4639	-.04658	-.06326	-.05074	-.1059
90.00	.0	.0	.0	.0	.0
100.00	-5.4639	-.04658	-.06326	-.05074	-.1059
110.00	-4.5210	-.04639	-.06294	-.05114	-.1069
120.00	-4.8319	-.04659	-.06330	-.05104	-.1064
130.00	-4.2014	-.04664	-.06343	-.05103	-.1066
134.00	-4.0110	-.04698	-.06433	-.05024	-.1045
140.00	-4.2014	-.04664	-.06343	-.05103	-.1066
150.00	-4.831	-.04649	-.06313	-.05102	-.1064
160.00	-4.5210	-.04639	-.06294	-.05114	-.1069
170.00	-5.4639	-.04658	-.06326	-.05074	-.1059
180.00	.0	.0	.0	.0	.0

θ	∂J/∂h Layer 3 to 4 ∂J/∂β of Layer 4	∂J/∂h Layer 4 to 5 ∂J/∂β of Layer 4	∂J/∂h Layer 4 to 5 ∂J/∂β of Layer 5	∂J/∂h Layer 5 to 6 ∂J/∂β of Layer 5	∂J/∂h Layer 5 to 6 ∂J/∂β of Layer 6
10.00	-.06865	-.2748	-.1464	-.2716	.03832
20.00	-.06877	-.2748	-.1528	-.2828	.03557
30.00	-.06902	-.2761	-.1559	-.2887	.03599
40.00	-.06794	-.2716	-.1563	-.2897	.03641
44.00	-.06751	-.2692	-.1558	-.2889	.03638
50.00	-.06794	-.2716	-.1563	-.2897	.03641
60.00	-.06902	-.2762	-.1559	-.2887	.03607
70.00	-.06877	-.2748	-.1528	-.2828	.03557
80.00	-.06865	-.2748	-.1464	-.2716	.03832
90.00	.0	.0	.0	.0	.0
100.00	-.06865	-.2748	-.1464	-.2716	.03832
110.00	-.06877	-.2748	-.1428	-.2828	.03557
120.00	-.06902	-.2761	-.1559	-.2887	.03599
130.00	-.06794	-.2716	-.1563	-.2897	.03641
134.00	-.06751	-.2692	-.1558	-.2889	.03638
140.00	-.06794	-.2716	-.1563	-.2897	.03641
150.00	-.06902	-.2762	-.1559	-.2887	.03607
160.00	-.06877	-.2748	-.1528	-.2828	.03557
170.00	-.06865	-.2748	-.1464	-.2716	.03832
180.00	.0	.0	.0	.0	.0

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DR(h,β)

T = 12 sec   STRIKE = 0°   DIP = 90°   SLIP = 45°

θ	∂J/∂h Layer 1 to 2 ∂J/∂β of Layer 1	∂J/∂h Layer 1 to 2 ∂J/∂β of Layer 2	∂J/∂h Layer 2 to 3 ∂J/∂β of Layer 2	∂J/∂h Layer 2 to 3 ∂J/∂β of Layer 3	∂J/∂h Layer 3 to 4 ∂J/∂β of Layer 3
10.00	-1.4247	-.1254	.05167	.3409	.02594
20.00	-1.1554	-.1231	.05064	.2484	.01754
30.00	- .6552	-.1177	.04626	.1371	.00836
40.00	- .1420	-.0806	.01047	.0119	.00028
44.00	- .0383	-.0375	-.02583	-.0211	-.00125
50.00	- .1101	-.0678	.01884	.0212	-.00074
60.00	- .2700	-.0579	.07102	.2020	.00338
70.00	.3284	.0643	.08568	.2739	.00236
80.00	6.7215	.5097	.09427	.2819	-.00011
90.00	- .0614	4.2732	.09746	.2779	-.00116
100.00	6.7215	.5097	.09427	.2819	-.00011
110.00	.3284	.0643	.08568	.2739	.00236
120.00	- .2700	-.0579	.07102	.2020	.00338
130.00	- .1101	-.0678	.01884	.0212	-.00074
134.00	- .0328	-.0337	-.02650	-.0212	-.00154
140.00	- .1420	-.0806	.01047	.0119	.00028
150.00	- .6552	-.1177	.04626	.1371	.00836
160.00	-1.1554	-.1231	.05064	.2484	.01754
170.00	-1.4247	-.1254	.05167	.3409	.02594
180.00	.0	.0	.0	.0	.0

θ	∂J/∂h Layer 3 to 4 ∂J/∂β of Layer 4	∂J/∂h Layer 4 to 5 ∂J/∂β of Layer 4	∂J/∂h Layer 4 to 5 ∂J/∂β of Layer 5	∂J/∂h Layer 5 to 6 ∂J/∂β of Layer 5	∂J/∂h Layer 5 to 6 ∂J/∂β of Layer 6
10.00	.04561	-.03085	.1533	-.04328	-.05126
20.00	.03376	-.03266	-.6900	.33353	.03831
30.00	.01704	-.03458	-.1165	.09991	.06774
40.00	.00068	-.04103	-.0672	.08912	.09471
44.00	-.00318	-.04308	-.0522	.07238	.07532
50.00	-.00170	-.03837	-.0616	.07511	.07657
60.00	.00589	-.02106	.2973	.09251	-.01767
70.00	.00378	-.01109	.0265	.08211	-.11804
80.00	-.00017	-.00787	.0167	.08780	-.14780
90.00	-.00170	-.00704	.0149	.08820	-.16684
100.00	-.00017	-.00787	.0167	.08780	-.14780
110.00	.00378	-.01109	.0265	.08211	-.11804
120.00	.00589	-.02106	.2973	.09251	-.01767
130.00	-.00170	-.03837	-.0616	.07511	.07657
134.00	-.00379	-.04155	-.0539	.07713	.09690
140.00	.00068	-.04103	-.0672	.08912	.09471
150.00	.01704	-.03458	-.1165	.09991	.06774
160.00	.03376	-.03266	-.6900	.33353	-.03831
170.00	.04561	-.03085	.1533	-.04328	-.05126
180.00	.0	.0	.0	.0	.0

DR(h,β)

T = 16 Sec   STRIKE = 0°   DIP = 90°   SLIP = 45°

θ	∂J/∂h Layer 1 to 2 ∂J/∂β of Layer 1	∂J/∂h Layer 1 to 2 ∂J/∂β of Layer 2	∂J/∂h Layer 2 to 3 ∂J/∂β of Layer 2	∂J/∂h Layer 2 to 3 ∂J/∂β of Layer 3	∂J/∂h Layer 3 to 4 ∂J/∂β of Layer 3
10.00	-2.2671	-.07832	.02395	.10486	.04386
20.00	-1.8846	-.07769	.02415	.09411	.03749
30.00	-1.1101	-.07554	.02213	.06153	.02505
40.00	- .2766	-.06226	.00065	.00094	.01027
44.00	- .0942	-.04399	-.02350	-.02210	.00676
50.00	- .2637	-.06012	.01137	.01605	.00985
60.00	-1.0270	-.05779	.04725	.17731	.02746
70.00	- .3196	-.01272	.06168	.28262	.03370
80.00	-2.5393	.18228	.07459	.33182	.03363
90.00	- .0755	1.83957	.08074	.34588	.03309
100.00	-2.5393	.18228	.07459	.33182	.03363
110.00	- .3196	-.01272	.06168	.28262	.03370
120.00	-1.0270	-.05779	.04725	.17731	.02746
130.00	- .2637	-.06012	.01137	.01605	.00985
140.00	- .0895	-.04319	-.02246	-.02113	.00654
150.00	- .2680	-.06226	.00065	.00084	.01027
160.00	-1.1101	-.07554	.02213	.06153	.02505
170.00	-1.8846	-.07769	.02415	.09411	.03749
180.00	-2.2671	-.07832	.02395	.10486	.04386
	.0	.0	.0	.0	.0

θ	∂J/∂h Layer 3 to 4 ∂J/∂β of Layer 4	∂J/∂h Layer 4 to 5 ∂J/∂β of Layer 4	∂J/∂h Layer 4 to 5 ∂J/∂β of Layer 5	∂J/∂h Layer 5 to 6 ∂J/∂β of Layer 5	∂J/∂h Layer 5 to 6 ∂J/∂β of Layer 6
10.00	-.18322	-.07707	-.1623	-.1761	.2028
20.00	-.22694	-.09800	-.1876	-.2296	.2087
30.00	-.65401	-.28764	1.3365	2.3063	.1602
40.00	.07914	.03409	.0334	.1432	.1227
44.00	.04029	.01728	.0190	.1225	.1110
50.00	.07578	.03684	.0432	.1640	.1078
60.00	-.26568	-.15052	-.1097	-.0923	.1310
70.00	-.15722	-.09654	-.0715	-.0283	.1874
80.00	-.14630	-.09460	-.0662	-.0174	.1093
90.00	-.14216	-.09391	-.0648	-.0139	.0903
100.00	-.14630	-.09460	-.0662	-.0174	.1093
110.00	-.15722	-.09654	-.0715	-.0283	.1874
120.00	-.26568	-.15052	-.1097	-.0923	.1310
130.00	.07578	.03684	.0432	.1640	.1078
134.00	.03949	.01721	.0185	.1211	.1051
140.00	.07914	.03409	.0334	.1432	.1227
150.00	-.65401	-.28764	1.3365	2.3063	.1602
160.00	-.22694	-.09800	-.1876	-.2296	.2087
170.00	-.18322	-.07707	-.1623	0.1761	.2028
180.00	.0	.0	.0	.0	.0

DR(h, θ)

T = 20 sec   STRIKE = 0°   DIP = 90°   SLIP - 45°

θ	$\partial J/\partial h$ Layer 1 to 2 $\partial J/\partial\theta$ of Layer 1	$\partial J/\partial h$ Layer 1 to 2 $\partial J/\partial\theta$ of Layer 2	$\partial J/\partial h$ Layer 2 to 3 $\partial J/\partial\theta$ of Layer 2	$\partial J/\partial h$ Layer 2 to 3 $\partial J/\partial\theta$ of Layer 3	$\partial J/\partial h$ Layer 3 to 4 $\partial J/\partial\theta$ of Layer 3
10.00	-2.2591	-.06083	.002248	.004394	.02932
20.00	-2.0036	-.06027	.003297	.006181	.02661
30.00	-1.2126	-.05845	.002532	.004033	.02051
40.00	- .3073	-.05085	-.017174	-.015659	.01022
44.00	- .1120	-.04039	-.039425	-.027573	.00728
50.00	- .3377	-.04957	-.002342	-.002599	.01057
60.00	-1.6385	-.04795	.032428	.094583	.02541
70.00	-1.9351	-.02633	.046145	.181735	.03089
80.00	-1.4660	.07367	.058907	.255328	.03199
90.00	- .0815	1.01349	.065675	.288873	.03211
100.00	-1.4660	.07367	.058907	.255328	.03199
110.00	-1.9351	-.02633	.046145	.181735	.03089
120.00	-1.6385	-.04795	.032428	.094583	.02541
130.00	- .3377	-.04957	-.002342	-.002599	.01057
134.00	- .1086	-.03998	-.037162	-.026595	.00717
140.00	- .3073	-.05085	-.017174	-.015659	.01022
150.00	-1.2126	-.05845	.002532	.004033	.02051
160.00	-2.0036	-.06027	.003297	.006181	.02661
170.00	-2.2591	-.06083	.002248	.004394	.02932
180.00	.0	.0	.0	.0	.0

θ	$\partial J/\partial h$ Layer 3 to 4 $\partial J/\partial\theta$ of Layer 4	$\partial J/\partial h$ Layer 4 to 5 $\partial J/\partial\theta$ of Layer 4	$\partial J/\partial h$ Layer 4 to 5 $\partial J/\partial\theta$ of Layer 5	$\partial J/\partial h$ Layer 5 to 6 $\partial J/\partial\theta$ of Layer 5	$\partial J/\partial h$ Layer 5 to 6 $\partial J/\partial\theta$ of Layer 6
10.00	-.0975	-.05790	-.009257	-.007838	-.4082
20.00	-.1032	-.06372	-.008969	-.008012	-.5373
30.00	-.1404	-.09501	-.008667	-.009027	.9741
40.00	.2972	.27784	-.008591	-.012865	.1977
44.00	.0896	.10141	-.008569	-.014587	.1340
50.00	.3590	.33212	-.007740	-.011058	.1719
60.00	-.1001	-.06363	-.006361	-.004858	-.3547
70.00	-.0861	-.05156	-.005750	-.003241	-.1449
80.00	-.0828	-.04905	-.005418	-.002649	-.1129
90.00	-.0828	-.04895	-.005312	-.002498	-.1119
100.00	-.0828	-.04905	-.005418	-.002649	-.1129
110.00	-.0861	-.05156	-.005750	-.003241	-.1449
120.00	-.1001	-.06363	-.006361	-.004858	-.3547
130.00	.3590	.33212	-.007740	-.011058	.1719
134.00	.0861	.09843	-.008397	-.014400	.1398
140.00	.2972	.27784	-.008591	-.012865	.1977
150.00	-.1404	-.09501	-.008667	-.009027	.9741
160.00	-.1032	-.06372	-.008969	-.008012	-.5373
170.00	-.0975	-.05790	-.009257	-.007838	-.4082
180.00	.0	.0	.0	.0	.0

DR(h,β)

T = 30 sec   STRIKE = 0°   DIP = 90°   SLIP = 45°

θ	∂J/∂h Layers 1 to 2 ∂J/∂β of Layer 1	∂J/∂h Layer 1 to 2 ∂J/∂β of Layer 2	∂J/∂h Layer 2 to 3 ∂J/∂β of Layer 2	∂J/∂h Layer 2 to 3 ∂J/∂β of Layer 3	∂J/∂h Layer 3 to 4 ∂J/∂β of Layer 3
10.00	-2.1967	-.04443	-.02999	-.02764	.00298
20.00	-1.8462	-.04414	-.02892	-.02617	.00382
30.00	-1.2135	-.04335	-.02989	-.02444	.00430
40.00	- .3110	-.04099	-.05518	-.02832	.00224
44.00	- .1114	-.93778	-.08307	-.03368	.00136
50.00	- .3805	-.04018	-.03411	-.02177	.00512
60.00	-2.1024	-.03840	.01192	.01879	.01769
70.00	-4.2831	-.02951	.03224	.07698	.02492
80.00	- .6953	.01381	.05211	.18122	.02892
90.00	- .0845	.68231	.06544	.28016	.03035
100.00	- .6953	.01381	.05211	.18122	.02892
110.00	-4.2831	-.02951	.03224	.07698	.02492
120.00	-2.1024	-.03840	.01192	.01879	.01769
130.00	- .3805	-.04018	-.03411	-.02177	.00512
134.00	-..1116	-.03779	-.07995	-.03326	.00170
140.00	- .3110	-.04099	-.05518	-.02832	.00224
150.00	-1.2135	-.04335	-.02989	-.02444	.00430
160.00	-1.8462	-.04414	-.02892	-.02617	.00383
170.00	-2.1967	-.04443	-.02999	-.02764	.00298
180.00	.0	.0	.0	.0	.0

θ	∂J/∂h Layer 3 to 4 ∂J/∂β of Layer 4	∂J/∂h Layer 4 to 5 ∂J/∂β of Layer 4	∂J/∂h Layer 4 to 5 ∂J/∂β of Layer 5	∂J/∂h Layer 5 to 6 ∂J/∂β of Layer 5	∂J/∂h Layer 5 to 6 ∂J/∂β of Layer 6
10.00	.0842	.4172	-.06157	-.06667	-.08626
20.00	.0877	.3269	-.06731	-.07292	-.09366
30.00	.0499	.1510	-.09395	-.10468	-.13630
40.00	.0125	.0573	.56006	.72887	.69736
44.00	.0067	.0447	.13454	.18745	.18903
50.00	.0334	.0674	28.57270	34.53836	2.31319
60.00	-1.4489	-1.1442	-.06226	-.05239	-.06765
70.00	-.3272	- .1964	-.05093	-.03706	-.04882
80.00	-.3041	- .1601	-.04923	-.03347	-.04384
90.00	-.3064	- .1549	-.04864	-.03140	-.04553
100.00	-.3041	- .1601	-.04923	-.03347	-.04384
110.00	-.3272	- .1964	-.05093	-.03706	-.04882
120.00	-1.4489	-1.1442	-.06226	-.05239	-.06765
130.00	.0334	.0674	28.57270	34.53836	2.31319
134.00	.0083	.0445	.13377	.18437	.17975
140.00	.0125	.0573	.56006	.72887	.69736
150.00	.0499	.1510	-.09395	-.10468	-.13630
160.00	.0877	.3269	-.06731	-.07292	-.09366
170.00	.0842	.4172	-.06157	-.06667	-.08626
180.00	.0	.0	.0	.0	.0

DR(h,β)

T = 40 sec   STRIKE = 0°   DIP = 90°   SLIP = 45°

θ	$\partial J/\partial h$ Layer 1 to 2 $\partial J/\partial \beta$ of Layer 1	$\partial J/\partial h$ Layer 1 to 2 $\partial J/\partial \beta$ of Layer 2	$\partial J/\partial h$ Layer 2 to 3 $\partial J/\partial \beta$ of Layer 2	$\partial J/\partial h$ Layer 2 to 3 $\partial J/\partial \beta$ of Layer 3	$\partial J/\partial h$ Layer 3 to 4 $\partial J/\partial \beta$ of Layer 3
10.00	-2.6321	-.04493	-.04220	-.03629	-.02188
20.00	-1.9842	-.04462	-.04220	-.03504	-.01871
30.00	-1.2874	-.04423	-.04528	-.03314	-.01377
40.00	- .3546	-.04307	-.07790	-.03406	-.00826
44.00	- .1147	-.04236	-.11333	-.03877	-.00666
50.00	- .4102	-.04225	-.05684	-.02987	-.00322
60.00	-2.5610	-.04068	-.00331	-.00411	.01024
70.00	-6.1954	-.03456	.02477	.04522	.02453
80.00	.1574	-.00256	.06022	.17678	.03664
90.00	- .0812	.82196	.09073	.39952	.04168
100.00	.1574	-.00256	.06022	.17678	.03664
110.00	-6.1954	-.03456	.02477	.04522	.02453
120.00	-2.5610	-.04068	-.00331	-.00411	.01024
130.00	- .4102	-.04225	-.05684	-.02987	-.00322
134.00	- .1144	-.04239	-.11131	-.03845	-.00591
140.00	- .3546	-.04307	-.07790	-.03406	-.00826
150.00	-1.2874	-.04423	-.04528	-.03314	-.01377
160.00	-1.9842	-.04462	-.04220	-.03504	-.01871
170.00	-2.6321	-.04493	-.04220	-.03629	-.02188
180.00	.0	.0	.0	.0	.0

θ	$\partial J/\partial h$ Layer 3 to 4 $\partial J/\partial \beta$ of Layer 4	$\partial J/\partial h$ Layer 4 to 5 $\partial J/\partial \beta$ of Layer 4	$\partial J/\partial h$ Layer 4 to 5 $\partial J/\partial \beta$ of Layer 5	$\partial J/\partial h$ Layer 5 to 6 $\partial J/\partial \beta$ of Layer 5	$\partial J/\partial h$ Layer 5 to 6 $\partial J/\partial \beta$ of Layer 6
10.00	-.05783	.001706	-.001942	-.05887	-.06245
20.00	-.05078	.006647	-.008420	-.06590	-.07269
30.00	-.03670	.012988	-.028026	-.10486	-.11476
40.00	-.01964	.014801	.080908	.20738	.22030
44.00	-.01536	.014181	.038993	.09426	.09642
50.00	-.00891	.022542	.235278	.43751	.41349
60.00	.06652	.091824	-.048090	-.05663	-.07220
70.00	.38681	.277720	-.047927	-.04461	-.05774
80.00	3.16454	1.689635	-.051917	-.04302	-.05686
90.00	-19.07733	-9.273250	-.053346	-.04253	-.05556
100.00	3.16454	1.689635	-.051917	-.04302	-.05686
110.00	.38681	.277720	-.047927	-.04461	-.05774
120.00	.06652	.091824	-.048090	-.05663	-.07220
130.00	-.00891	.022542	.235278	.43751	.41349
134.00	-.01394	.015185	.041670	.09431	.09352
140.00	-.01964	.014801	.080908	.20738	.22030
150.00	-.03670	.012988	-.028026	-.10486	-.11476
160.00	-.05078	.006647	-.008420	-.06590	-.07269
170.00	-.05783	.001706	-.001942	-.05887	-.06245
180.00	.0	.0	.0	.0	.0

TABLE IV

DR(h,δ)

T = 12 Seconds   λ = 0°

θ	∂J/∂h Layer 1 to 2 ∂J/∂δ for Source in Layer 1	∂J/∂h Layer 1 to 2 ∂J/∂δ for Source in Layer 2	∂J/∂h Layer 2 to 3 ∂J/∂δ for Source in Layer 2	∂J/∂h Layer 2 to 3 ∂J/∂δ for Source in Layer 3	∂J/∂h Layer 3 to 4 ∂J/∂δ for Source in Layer 3
10.00	14589.1200	2.7674	-1.0384	- 2.9176	- .4193
20.00	-486487.9236	4.8239	-1.8101	- 5.9563	- .8560
30.00	- 10542.1116	7.7863	-2.9217	-10.6092	- 1.5247
40.00	- 711.5536	11.8042	-4.4294	-25.4075	- 3.6514
44.00	- 28.2917	-57.3203	21.5089	2.2194	.3190
50.00	- 501.3786	16.3930	-6.1513	-83.5137	-12.0021
60.00	- 3252.0278	18.9374	-7.1061	-31.8388	- 4.5757
70.00	- 6521.5246	21.7255	-8.1523	-34.5805	- 4.9697
80.00	- 8968.6165	23.5805	-8.8484	-37.0468	- 5.3242
90.00	0	0	0	0	0
100.00	- 8968.6166	23.5805	-8.8484	-37.0468	- 5.3242
110.00	- 6521.5245	21.7255	-8.1523	-34.5805	- 4.9697
120.00	- 3252.0279	18.9374	-7.1061	-31.8388	- 4.5757
130.00	- 501.3785	16.3930	-6.1513	-83.5137	-12.0021
134.00	- 26.6139	-34.5384	12.9602	2.0627	.2964
140.00	- 711.5536	11.8042	-4.4294	-25.4075	- 3.6514
150.00	- 10542.1117	7.7863	-2.9217	-10.6092	- 1.5247
160.00	-486488.3973	4.8239	-1.8101	- 5.9563	- .8560
170.00	14589.1201	2.7674	-1.0384	- 2.9176	- .4193
180.00	0	0	0	0	0

θ	∂J/∂h Layer 3 to 4 ∂J/∂δ for Source in Layer 4	∂J/∂h Layer 4 to 5 ∂J/∂δ for Source in Layer 4	∂J/∂h Layer 4 to 5 ∂J/∂δ for Source in Layer 5	∂J/∂h Layer 5 to 6 ∂J/∂δ for Source in Layer 5	∂J/∂h Layer 5 to 6 ∂J/∂δ for Source in Layer 6
10.00	- .6797	.0249	.0248	- .0158	-.0170
20.00	- 1.6082	.0589	.0588	- .0376	-.0419
30.00	- 3.0921	.1133	.1143	- .0731	-.0816
40.00	-15.6617	.5737	2.3444	-1.4990	-.3679
44.00	.3430	-.0126	-.0100	.0064	.0093
50.00	16.7034	-.6118	-.2852	.1823	.5539
60.00	-11.3750	.4167	.4772	- .3051	-.2975
70.00	-11.4750	.4203	.4492	- .2872	-.3037
80.00	-12.0826	.4426	.4656	- .2977	-.3207
90.00	0	0	0	0	0
100.00	-12.0826	.4426	.4656	- .2977	-.3207
110.00	-11.4750	.4203	.4492	- .2872	-.3037
120.00	-11.3750	.4167	.4772	- .3051	-.2975
130.00	16.7034	-.6118	-.2852	.1823	.5539
134.00	.3218	-.0118	-.0094	.0060	.0087
140.00	-15.6617	.5737	2.3444	-1.4990	-.3679
150.00	- 3.0921	.1133	.1143	- .0731	-.0816
160.00	- 1.6082	.0589	.0588	- .0376	-.0419
170.00	- .6797	.0249	.0248	- .0158	-.0170
180.00	0	0	0	0	0

DR(h,δ)

T = 12 Seconds $\lambda = 45°$

θ	$\partial J/\partial h$ Layer 1 to 2 $\partial J/\partial \delta$ for Source in Layer 1	$\partial J/\partial h$ Layer 1 to 2 $\partial J/\partial \delta$ for Source in Layer 2	$\partial J/\partial h$ Layer 2 to 3 $\partial J/\partial \delta$ for Source in Layer 2	$\partial J/\partial h$ Layer 2 to 3 $\partial J/\partial \delta$ for Source in Layer 3	$\partial J/\partial h$ Layer 3 to 4 $\partial J/\partial \delta$ Source in Layer 3
10.00	17.2177	- .1360	.0560	- 3.2890	- .2474
20.00	73.3978	- .7091	.2916	10.2811	.7274
30.00	-26.4127	- .9781	.3841	2.6445	.1641
40.00	- 3.9267	- .5567	.0721	.2818	.0074
44.00	- 1.8361	- .2827	- .1955	- .7093	- .0430
50.00	1.9555	2.7186	- .7521	-15.8527	.5601
60.00	.9271	2.3682	-2.9008	- 3.8755	- .0676
70.00	- .6474	-10.7102	-14.2720	- 6.9867	- .0621
80.00	- 1.9708	138.1522	25.5577	-16.8289	.0054
90.00	- 2.1904	419.3027	9.5734	87.2187	- .3492
100.00	.3829	32.8730	6.0814	12.3435	- .0040
110.00	.1744	2.9510	3.9325	6.1700	.0548
120.00	- .4080	- 1.6930	2.0737	3.4003	.0593
130.00	- .6595	- 1.0277	.2843	.8610	- .0304
134.00	- .5191	- .6548	- .5125	-185.6569	-13.2884
140.00	4.6950	1.2565	- .1628	- .3099	- .0082
150.00	16.5548	2.2071	- .8667	- 1.8221	- .1131
160.00	-65.6186	2.5470	-1.0475	- 2.3548	- .1666
170.00	-11.1622	2.0672	- .8513	- 1.7192	- .1293
180.00	0	0	0	0	0

θ	$\partial J/\partial h$ Layer 3 to 4 $\partial J/\partial \delta$ for Source in Layer 4	$\partial J/\partial h$ Layer 4 to 5 $\partial J/\partial \delta$ for Source in Layer 4	$\partial J/\partial h$ Layer 4 to 5 $\partial J/\partial \delta$ for Source in Layer 5	$\partial J/\partial h$ Layer 5 to 6 $\partial J/\partial \delta$ for Source in Layer 5	$\partial J/\partial h$ Layer 5 to 6 $\partial J/\partial \delta$ for Source in Layer 6
10.00	- .2379	.1688	.1726	- .0440	- .0467
20.00	6.8817	-6.7287	-3.0352	1.4599	1.0565
30.00	.2525	- .5174	- .4969	.4311	.4040
40.00	-.0098	- .5354	- .5352	.7049	.6450
44.00	- .0567	- .7445	- .7274	1.0282	.9745
50.00	.1621	3.6437	-957.6124	1179.0552	-2.5558
60.00	- .0617	.2109	.2385	.0804	.0618
70.00	- .0513	.1500	.1609	.4831	.3991
80.00	.0038	.2267	.2455	1.2414	1.0135
90.00	8.4032	37.0932	-4.9960	-28.7174	427.9968
100.00	- .0038	- .2246	- .2204	- 1.1146	- .9906
110.00	.0494	- .1444	- .1469	- .4410	- .3790
120.00	.0545	- .1862	- .1987	- .0670	- .0544
130.00	- .0294	- .6608	- .9114	1.1221	.6243
134.00	-1.5160	-16.8721	3.5790	- 5.0351	4.0182
140.00	- .0092	.5051	.4730	- .6231	- .6604
150.00	- .1345	.2757	.2655	- .2303	- .2364
160.00	- .2105	.2058	.1970	- .0948	- .1008
170.00	- .1568	.1113	.1076	- .0275	- .0291
180.00	0	0	0	0	0

DR(h,δ)

T = 16 Seconds   λ = 0°

θ	∂J/∂h Layer 1 to 2 ∂J/∂δ for Source in Layer 1	∂J/∂h Layer 1 to 2 ∂J/∂δ for Source in Layer 2	∂J/∂h Layer 2 to 3 ∂J/∂δ for Source in Layer 2	∂J/∂h Layer 2 to 3 ∂J/∂δ for Source in Layer 3	∂J/∂h Layer 3 to 4 ∂J/∂δ for Source in Layer 3
10.00	4866.1606	5.4202	2.5454	.5677	- .7007
20.00	46914.3226	15.8211	7.4299	.8656	-1.0683
30.00	- 7099.1588	31.9851	15.0208	1.2822	-1.5825
40.00	- 443.3283	67.3625	31.6346	2.0361	-2.5129
44.00	- 16.7768	- 9.0434	- 4.2469	- .8645	1.0670
50.00	- 311.5883	139.5038	65.5134	3.0794	-3.8005
60.00	- 2039.5212	100.7815	47.3287	2.9023	-3.5819
70.00	- 4113.7526	113.3522	53.2321	3.2401	-3.9988
80.00	- 5676.9895	122.8341	57.6850	3.4802	-4.2952
90.00	0	0	0	0	0
100.00	- 5676.9896	122.8341	57.6850	3.4802	-4.2952
110.00	- 4113.7529	113.3522	53.2321	3.2401	-3.9988
120.00	- 2039.5212	100.7815	47.3287	2.9023	-3.5819
130.00	- 311.5883	139.5038	65.5134	3.0794	-3.8005
134.00	- 15.7431	- 8.3060	- 3.9006	- .7716	.9523
140.00	- 443.3283	67.3625	31.6346	2.0361	-2.5129
150.00	- 7099.1580	31.9851	15.0208	1.2822	-1.5825
160.00	46914.3337	15.8211	7.4299	.8656	-1.0683
170.00	4866.1607	5.4202	2.5454	.5677	- .7007
180.00	0	0	0	0	0

θ	∂J/∂h Layer 3 to 4 ∂J/∂δ for Source in Layer 4	∂J/∂h Layer 4 to 5 ∂J/∂δ for Source in Layer 4	∂J/∂h Layer 4 to 5 ∂J/∂δ for Source in Layer 5	∂J/∂h Layer 5 to 6 ∂J/∂δ for Source in Layer 5	∂J/∂h Layer 5 to 6 ∂J/∂δ for Source in Layer 6
10.00	- 2.0860	- .3264	- .3984	- .3917	- .5159
20.00	- 4.3220	- .6763	- .8536	- .8393	-1.1924
30.00	- 7.7929	- 1.2194	-1.5716	-1.5452	-2.2570
40.00	- 23.3584	- 3.6550	-6.4659	-6.3574	-7.5179
44.00	1.2479	.1953	.2010	.1977	.3173
50.00	-1604.2055	-251.0144	12.5638	12.3529	61.5763
60.00	- 24.8746	- 3.8922	-5.4182	-5.3272	-7.6338
70.00	- 26.2789	- 4.1119	-5.5427	-5.4496	-8.0146
80.00	- 27.9562	- 4.3744	-5.8512	-5.7529	-8.5204
90.00	0	0	0	0	0
100.00	- 27.9562	- 4.3744	-5.8512	-5.7529	-8.5204
110.00	- 26.2789	- 4.1119	-5.5427	-5.4496	-8.0146
120.00	- 24.8746	- 3.8922	-5.4182	-5.3272	-7.6338
130.00	-1604.2074	-251.0147	12.5638	12.3529	61.5762
134.00	1.1659	.1824	.1885	.1853	.2967
140.00	- 23.3584	- 3.6550	-6.4659	-6.3574	-7.5179
150.00	- 7.7929	- 1.2194	-1.5716	-1.5452	-2.2570
160.00	- 4.3220	- .6763	- .8536	- .8393	-1.1924
170.00	- 2.0860	- .3264	- .3984	- .3917	- .5159
180.00	0	0	0	0	0

DR(h,δ)

T = 16 Seconds   λ = 45°

θ	∂J/∂h Layer 1 to 2 ∂J/∂δ for Source in Layer 1	∂J/∂h Layer 1 to 2 ∂J/∂δ for Source in Layer 2	∂J/∂h Layer 2 to 3 ∂J/∂δ for Source in Layer 2	∂J/∂h Layer 2 to 3 ∂J/∂δ for Source in Layer 3	∂J/∂h Layer 3 to 4 ∂J/∂δ for Source in Layer 3
10.00	13.9951	- .9288	.2841	.2467	.1031
20.00	54.9232	-1.7383	.5399	.3042	.1216
30.00	-26.7593	-1.7500	.5130	.4179	.1700
40.00	- 4.3653	- .9222	.0096	.0108	.1325
44.00	- 2.7013	- .6399	- .3408	- .4046	.1243
50.00	2.6905	2.4261	- .4604	.7090	.4341
60.00	1.7971	2.5701	-2.1018	-23.4021	-3.6318
70.00	.2659	1.1427	-5.5365	-297.5397	-35.5383
80.00	- 1.4766	-60.7686	-24.8630	48.2231	4.8923
90.00	- 2.1197	352.9567	15.4958	28.0732	2.6847
100.00	.3277	14.7483	6.0342	19.0607	1.9337
110.00	- .0694	- .7007	3.3947	12.0528	1.4396
120.00	- .7802	-2.1421	1.7518	6.4337	.9984
130.00	- .9484	-1.1781	.2235	1.7851	1.0928
134.00	- .9302	- .9921	- .5163	2.8179	- .8732
140.00	4.9031	1.5958	- .0165	- .0227	- .2789
150.00	17.0217	2.5844	- .7577	- .9427	- .3834
160.00	-42.5440	3.1178	- .9683	- 1.0606	- .4239
170.00	- 8.4866	2.4766	- .7575	- .8249	- .3449
180.00	0	0	0	0	0

θ	∂J/∂h Layer 3 to 4 ∂J/∂δ for Source in Layer 4	∂J/∂h Layer 4 to 5 ∂J/∂δ for Source in Layer 4	∂J/∂h Layer 4 to 5 ∂J/∂δ for Source in Layer 5	∂J/∂h Layer 5 to 6 ∂J/∂δ for Source in Layer 5	∂J/∂h Layer 5 to 6 ∂J/∂δ for Source in Layer 6
10.00	-1.0281	- .4330	- .5308	- .5788	- .6389
20.00	3.4652	1.4840	1.4229	1.7641	2.4905
30.00	.9393	.4099	.4502	.7875	.9254
40.00	.4026	.1740	.1946	.8245	.9081
44.00	.3558	.1537	.1701	1.0789	1.2315
50.00	5.8414	2.8190	1.7057	6.5132	-6.8177
60.00	-1.0044	- .5636	- .6660	- .5733	- .4502
70.00	-1.5026	- .9173	-1.0430	- .4193	- .3494
80.00	-3.3569	-2.1670	-2.4743	- .6467	- .5022
90.00	15.2517	10.0485	9.3603	2.0840	3.9039
100.00	2.3751	1.5332	1.6305	.4261	.4102
110.00	1.2891	.7870	.8549	.3437	.3134
120.00	.8393	.4709	.5277	.4543	.3903
130.00	.8328	.4019	.5233	1.9983	1.1237
134.00	-2.0667	- .9140	- .6914	-4.4213	9.1991
140.00	- .4128	- .1785	- .1956	- .8288	- .9844
150.00	- .6218	- .2714	- .3038	- .5313	- .6169
160.00	- .7439	- .3186	- .3607	- .4472	- .5403
170.00	- .5389	- .2269	- .2578	- .2811	- .3343
180.00	0	0	0	0	0

DR(h,δ)

T = 20 Seconds   λ = 0°

θ	∂J/∂h Layer 1 to 2 ∂J/∂δ for Source in Layer 1	∂J/∂h Layer 1 to 2 ∂J/∂δ for Source in Layer 2	∂J/∂h Layer 2 to 3 ∂J/∂δ for Source in Layer 2	∂J/∂h Layer 2 to 3 ∂J/∂δ for Source in Layer 3	∂J/∂h Layer 3 to 4 ∂J/∂δ for Source in Layer 3
10.00	2733.2571	10.4671	399.4511	1.0754	- .8882
20.00	18385.0593	36.5017	1392.9949	1.1000	- .9085
30.00	-6065.7369	78.5989	2999.5249	1.1242	- .9285
40.00	- 351.9419	444.0968	16947.8129	1.1504	- .9502
44.00	- 12.9458	- 6.7414	- 257.2682	1.2512	-1.0334
50.00	- 246.8953	-395.1418	-15079.5700	1.1734	- .9691
60.00	-1627.4623	315.4869	12039.7443	1.1847	- .9785
70.00	-3299.4888	318.8119	12166.6357	1.1968	- .9885
80.00	-4567.5540	336.4264	12838.8478	1.2045	- .9948
90.00	0	0	0	0	0
100.00	-4567.5537	336.4264	12838.8478	1.2045	- .9948
110.00	-3299.4888	318.8119	12166.6358	1.1968	- .9885
120.00	-1627.4623	315.4869	12039.7445	1.1847	- .9785
130.00	- 246.8953	-395.1418	-15079.5693	1.1734	- .9691
134.00	- 12.1299	- 6.2776	- 239.5702	1.2658	-1.0455
140.00	- 351.9419	444.0968	16947.8123	1.1504	- .9502
150.00	-6065.7369	78.5989	2999.5249	1.1242	- .9285
160.00	18385.0655	36.5017	1392.9949	1.1000	- .9085
170.00	2733.2571	10.4671	399.4511	1.0754	- .8882
180.00	0	0	0	0	0

θ	∂J/∂h Layer 3 to 4 ∂J/∂δ for Source in Layer 4	∂J/∂h Layer 4 to 5 ∂J/∂δ for Source in Layer 4	∂J/∂h Layer 4 to 5 ∂J/∂δ for Source in Layer 5	∂J/∂h Layer 5 to 6 ∂J/∂δ for Source in Layer 5	∂J/∂h Layer 5 to 6 ∂J/∂δ for Source in Layer 6
10.00	- 30.4772	- .5336	- .8697	- .5927	- .9602
20.00	- 49.9811	- .8751	-1.6013	-1.0911	-2.0248
30.00	- 78.1996	-1.3692	-2.7013	-1.8407	-3.6616
40.00	-142.7543	-2.4995	-6.0463	-4.1201	-8.8680
44.00	29.3076	.5131	.6381	.4348	.7490
50.00	- 26.1585	-4.5551	-16.7154	-11.3903	-29.8890
60.00	-194.9684	-3.4137	-7.6240	-5.1952	-11.1467
70.00	-215.4981	-3.7731	-8.2890	-5.6483	-12.1139
80.00	-231.2344	-4.0487	-8.8720	-6.0456	-12.9838
90.00	0	0	0	0	0
100.00	-231.2344	-4.0487	-8.8720	-6.0456	-12.9838
110.00	-215.4981	-3.7731	-8.2890	-5.6483	-12.1139
120.00	-194.9684	-3.4137	-7.6240	-5.1952	-11.1467
130.00	-260.1585	-4.5551	-16.7154	-11.3903	-29.8890
134.00	26.8403	.4699	.5919	.4033	.6962
140.00	-142.7543	-2.4995	-6.0463	-4.1201	-8.8680
150.00	- 78.1996	-1.3692	-2.7013	-1.8407	-3.6616
160.00	- 49.9811	- .8751	-1.6013	-1.0911	-2.0248
170.00	- 30.4772	- .5336	- .8697	- .5927	- .9602
180.00	0	0	0	0	0

DR(h,δ)

T = 20 Seconds   λ = 45°

θ	∂J/∂h Layer 1 to 2 ∂J/∂δ for Source in Layer 1	∂J/∂h Layer 1 to 2 ∂J/∂δ for Source in Layer 2	∂J/∂h Layer 2 to 3 ∂J/∂δ for Source in Layer 2	∂J/∂h Layer 2 to 3 ∂J/∂δ for Source in Layer 3	∂J/∂h Layer 3 to 4 ∂J/∂δ for Source in Layer 3
10.00	9.3882	-3.4044	.1277	.2036	1.3369
20.00	34.5391	-3.8550	.2114	.0731	.3142
30.00	-21.1372	-2.8247	.1219	.0564	.2879
40.00	- 3.4828	-1.2068	- .4071	- .3092	.2020
44.00	- 2.2716	- .8832	- .8632	- .7353	.1937
50.00	2.3294	1.7906	.0832	- .1996	.8231
60.00	1.9153	1.8631	-1.2593	-9.5150	-2.5572
70.00	.8158	1.4159	-2.4816	-39.9150	-6.7848
80.00	- .9960	-5.7816	-4.6253	163.5769	20.4946
90.00	- 2.0240	-891.3881	-57.7599	46.8524	5.2138
100.00	.2359	5.2848	4.2278	24.6768	3.0918
110.00	- .2066	-1.1090	1.9437	12.0225	2.0436
120.00	- .8204	-1.4698	.9934	4.8556	1.3050
130.00	- .8513	- .8843	- .0411	- .3055	1.2602
134.00	- .8472	- .8051	- .7492	5.2207	-1.4052
140.00	3.6793	1.6249	.5481	.5542	- .3622
150.00	13.4610	2.8570	- .1233	- .0929	- .4744
160.00	-25.0354	4.0598	- .2226	- .1189	- .5113
170.00	- 5.4227	3.3390	- .1253	- .0614	- .4032
180.00	0	0	0	0	0

θ	∂J/∂h Layer 3 to 4 ∂J/∂δ for Source in Layer 4	∂J/∂h Layer 4 to 5 ∂J/∂δ for Source in Layer 4	∂J/∂h Layer 4 to 5 ∂J/∂δ for Source in Layer 5	∂J/∂h Layer 5 to 6 ∂J/∂δ for Source in Layer 5	∂J/∂h Layer 5 to 6 ∂J/∂δ for Source in Layer 6
10.00	-2.1640	-1.2797	-1.5264	-1.3017	-1.2467
20.00	1.3155	.8073	1.1514	1.0356	1.8141
30.00	.7317	.4955	.6617	.6894	.9626
40.00	.3975	.3717	.4765	.7110	.8984
44.00	.3635	.4123	.5273	.9016	1.1716
50.00	1.7582	1.6288	2.4040	3.4504	-20.8513
60.00	-2.1213	-1.3526	-1.4146	-1.0692	- .8084
70.00	-3.6055	-2.1577	-2.1747	-1.2207	- .9527
80.00	-13.0675	-7.7320	-6.6410	-3.2600	-2.0422
90.00	10.4930	6.1983	7.7643	3.6528	5.9191
100.00	3.8766	2.2938	2.5254	1.2397	1.2545
110.00	2.2832	1.3664	1.4747	.8278	.7778
120.00	1.4807	.9442	1.0204	.7712	.6814
130.00	1.7826	1.6515	1.6850	2.4184	1.3875
134.00	-1.5332	-1.7585	-2.4008	-4.1159	14.4884
140.00	- .5020	- .4694	- .5730	- .8551	-1.0798
150.00	- .7046	- .4772	- .5928	- .6176	- .7701
160.00	- .7931	- .4867	- .6186	- .5564	- .7223
170.00	- .5990	- .3542	- .4457	- .3801	- .4820
180.00	0	0	0	0	0

DR(h,δ)

T = 30 Seconds λ = 0°

θ	∂J/∂h Layer 1 to 2 ∂J/∂δ for Source in Layer 1	∂J/∂h Layer 1 to 2 ∂J/∂δ for Source in Layer 2	∂J/∂h Layer 2 to 3 ∂J/∂δ for Source in Layer 2	∂J/∂h Layer 2 to 3 ∂J/∂δ for Source in Layer 3	∂J/∂h Layer 3 to 4 ∂J/∂δ for Source in Layer 3
10.00	1737.6040	27.4973	49.7058	1.4441	7.4478
20.00	10099.8645	105.2587	190.2721	3.5020	18.0606
30.00	-5295.5271	251.8420	455.2453	6.7455	34.7882
40.00	- 285.1913	-211.1868	- 381.7543	21.6674	111.7445
44.00	- 10.1385	- 4.9538	- 8.9549	- .9578	- 4.9397
50.00	- 199.6986	-115.2148	- 208.2694	-381.5060	-1967.5298
60.00	-1325.4683	-7665.7989	-13857.1734	22.9177	118.1928
70.00	-2700.4580	2176.2353	3933.8978	24.2122	124.8687
80.00	-3749.5689	1763.6521	3188.0868	25.7891	133.0014
90.00	0	0	0	0	0
100.00	-3749.5689	1763.6523	3188.0873	25.7891	133.0014
110.00	-2700.4578	2176.2350	3933.8974	24.2122	124.8687
120.00	-1325.4682	-7665.8017	-13857.1785	22.9177	118.1928
130.00	- 199.6986	- 115.2148	- 208.2694	-381.5059	-1967.5291
134.00	- 9.4804	- 4.6305	- 8.3703	- .8946	- 4.6136
140.00	- 285.1913	- 211.1868	- 381.7543	21.6674	111.7445
150.00	-5295.5264	251.8420	455.2453	6.7455	34.7832
160.00	10099.8717	105.2587	190.2721	3.5020	18.0606
170.00	1737.6041	27.4973	49.7058	1.4441	7.4478
180.00	0	0	0	0	0

θ	∂J/∂h Layer 3 to 4 ∂J/∂δ for Source in Layer 4	∂J/∂h Layer 4 to 5 ∂J/∂δ for Source in Layer 4	∂J/∂h Layer 4 to 5 ∂J/∂δ for Source in Layer 5	∂J/∂h Layer 5 to 6 ∂J/∂δ for Source in Layer 5	∂J/∂h Layer 5 to 6 ∂J/∂δ for Source in Layer 6
10.00	.8029	.0958	.0864	- .9799	- 4.1725
20.00	.9528	.1137	.0987	-1.1202	- 6.4584
30.00	1.1314	.1350	.1129	-1.2810	- 9.6573
40.00	1.3688	.1634	.1307	-1.4831	-14.7675
44.00	7.1450	.8529	.2976	-3.3768	10.2330
50.00	1.6170	.1930	.1487	-1.6867	-21.2219
60.00	1.7142	.2046	.1570	-1.7814	-21.8498
70.00	1.8483	.2206	.1671	-1.8959	-24.6066
80.00	1.9379	.2313	.1738	-1.9715	-26.5057
90.00	0	0	0	0	0
100.00	1.9379	.2313	.1738	-1.9715	-26.5057
110.00	1.8483	.2206	.1671	-1.8959	-24.6066
120.00	1.7142	.2046	.1570	-1.7814	-21.8498
130.00	1.6170	.1930	.1487	-1.6867	-21.2219
134.00	13.7224	1.6380	.3520	-3.9938	8.8673
140.00	1.3688	.1634	.1307	-1.4831	-14.7675
150.00	1.1314	.1350	.1129	-1.2810	- 9.6573
160.00	.9528	.1137	.0987	-1.1202	- 6.4584
170.00	.8029	.0958	.0864	- .9799	- 4.1725
180.00	0	0	0	0	0

DR(h,δ)

T = 30 Seconds   λ = 45°

θ	∂J/∂h Layer 1 to 2 ∂J/∂δ for Source in Layer 1	∂J/∂h Layer 1 to 2 ∂J/∂δ for Source in Layer 2	∂J/∂h Layer 2 to 3 ∂J/∂δ for Source in Layer 2	∂J/∂h Layer 2 to 3 ∂J/∂δ for Source in Layer 3	∂J/∂h Layer 3 to 4 ∂J/∂δ for Source in Layer 3
10.00	4.1595	8.4845	5.7059	- .0685	.0073
20.00	13.7818	-20.5255	-13.4317	- .2738	.0399
30.00	-11.9140	- 4.0925	- 2.8244	- .3902	.0687
40.00	- 1.8699	- 1.1749	- 1.5812	- .6075	.0478
44.00	- 1.2899	- .9168	- 2.0141	- .9828	.0391
50.00	1.2665	1.0520	.8923	- 2.9257	.6901
60.00	1.2858	1.0846	- .3365	- 1.6836	-1.5871
70.00	.9330	.9309	- 1.0178	- 17.5069	-5.6628
80.00	- .2565	- .4158	- 1.5697	102.5145	16.3659
90.00	- 1.8302	-29.3124	- 2.8078	42.9505	4.6537
100.00	.0626	.4040	1.5253	17.0327	2.7192
110.00	- .2211	- .4844	.5296	5.1111	1.6533
120.00	- .5356	- .6146	.1907	.9317	.8782
130.00	- .4934	- .4560	- .3868	- 1.6026	.3780
134.00	- .5242	- .4824	- 1.0214	-45[illegible].3860	23.5145
140.00	1.7487	1.2717	1.7115	1.1676	- .0919
150.00	7.5383	2.9951	2.0670	.7291	- .1284
160.00	- 9.2394	11.1197	7.2766	.7220	- .1053
170.00	- 2.2132	-22.3708	-15.0446	.5705	- .0606
180.00	0	0	0	0	0

θ	∂J/∂h Layer 3 to 4 ∂J/∂δ for Source in Layer 4	∂J/∂h Layer 4 to 5 ∂J/∂δ for Source in Layer 4	∂J/∂h Layer 4 to 5 ∂J/∂δ for Source in Layer 5	∂J/∂h Layer 5 to 6 ∂J/∂δ for Source in Layer 5	∂J/∂h Layer 5 to 6 ∂J/∂δ for Source in Layer 6
10.00	.0302	.1519	.6018	.6538	9.1832
20.00	.0343	.1282	.2636	.2856	.6284
30.00	.0608	.1841	.2852	.3176	.5317
40.00	.0462	.2130	.2927	.3787	.5410
44.00	.0380	.2593	.3529	.4909	.7012
50.00	.4047	.8147	1.4088	1.7037	14.5590
60.00	-3.8618	-3.0439	-2.0989	-1.7711	-1.1649
70.00	-22.6394	-13.5988	-5.3477	-3.8940	-2.1221
80.00	13.0839	6.8948	20.7287	14.0845	-11.0757
90.00	6.6365	3.3538	4.5566	3.0285	4.3780
100.00	4.2840	2.2575	2.6281	1.7857	1.9296
110.00	2.6160	1.5714	1.7103	1.2454	1.2251
120.00	1.3662	1.0769	1.1307	.9540	.8879
130.00	.7620	1.5341	1.3888	1.6794	1.1900
134.00	- .4161	-2.1927	-4.2205	-5.8312	7.1752
140.00	- .0948	- .4368	- .5303	- .6861	- .8674
150.00	- .1284	- .3888	- .4720	- .5257	- .6653
160.00	- .0990	- .3704	- .4527	- .4906	- .6390
170.00	- .0559	- .2812	- .3370	- .3661	- .4648
180.00	0	0	0	0	0

DR(h,δ)

T = 40 Seconds   λ = 0°

θ	∂J/∂h Layer 1 to 2 ∂J/∂δ for Source in Layer 1	∂J/∂h Layer 1 to 2 ∂J/∂δ for Source in Layer 2	∂J/∂h Layer 2 to 3 ∂J/∂δ for Source in Layer 2	∂J/∂h Layer 2 to 3 ∂J/∂δ for Source in Layer 3	∂J/∂h Layer 3 to 4 ∂J/∂δ for Source in Layer 3
10.00	1716.7772	45.7247	62.0835	2.3983	5.0076
20.00	9784.7640	178.9135	242.9230	7.7860	16.2570
30.00	-5536.8907	473.5531	642.9752	16.9845	35.4630
40.00	- 293.6014	- 165.0005	- 224.0324	-62.6176	-130.7435
44.00	- 10.2829	- 4.7293	- 6.4213	- .7996	- 1.6694
50.00	- 205.4875	- 102.4471	- 139.0994	-19.9476	- 41.6500
60.00	-1366.2445	- 1262.7014	- 1714.4554	107.0624	223.5429
70.00	-2786.3273	-11470.1806	-15573.8428	82.1997	171.6303
80.00	-3871.1413	13670.9366	18561.9586	82.0518	171.3214
90.00	0	0	0	0	0
100.00	-3871.1403	13670.9365	18561.9585	82.0518	171.3214
110.00	-2786.3263	-11470.1909	-15573.8568	82.1997	171.6303
120.00	-1366.2443	- 1262.7013	- 1714.4552	107.0624	223.5429
130.00	- 205.4875	- 102.4471	- 139.0994	-19.9476	- 41.6500
134.00	- 9.6060	- 4.4196	- 6.0008	- .7514	- 1.5688
140.00	- 293.6014	- 165.0005	- 224.0324	-62.6176	-130.7435
150.00	-5536.8907	473.5531	642.9752	16.9845	35.4630
160.00	9784.7640	178.9135	242.9230	7.7860	16.2570
170.00	1716.7774	45.7247	62.0835	2.3983	5.0076
180.00	0	0	0	0	0

θ	∂J/∂h Layer 3 to 4 ∂J/∂δ for Source in Layer 4	∂J/∂h Layer 4 to 5 ∂J/∂δ for Source in Layer 4	∂J/∂h Layer 4 to 5 ∂J/∂δ for Source in Layer 5	∂J/∂h Layer 5 to 6 ∂J/∂δ for Source in Layer 5	∂J/∂h Layer 5 to 6 ∂J/∂δ for Source in Layer 6
10.00	.9021	3.6106	.8496	1.5688	.6880
20.00	1.9072	7.6335	1.1034	2.0374	.7654
30.00	3.4400	13.7685	1.4275	2.6358	.8512
40.00	7.2840	29.1539	1.8655	3.4446	.9484
44.00	- .9177	- 3.6729	-70.6474	-130.4457	1.2953
50.00	16.3731	65.5330	2.3460	4.3317	1.0431
60.00	10.0901	40.3855	2.5599	4.7267	1.1057
70.00	11.1768	44.7351	2.8312	5.2275	1.1648
80.00	12.0406	48.1924	3.0125	5.5623	1.2031
90.00	0	0	0	0	0
100.00	12.0406	48.1924	3.0125	5.5623	1.2031
110.00	11.1768	44.7351	2.8312	5.2275	1.1648
120.00	10.0901	40.3855	2.5599	4.7267	1.1057
130.00	16.3731	65.5330	2.3460	4.3317	1.0431
134.00	- .8477	- 3.3928	-13.1901	-24.3546	1.3690
140.00	7.2840	29.1539	1.8655	3.4446	.9484
150.00	3.4400	13.7685	1.4275	2.6358	.8512
160.00	1.9072	7.6335	1.1034	2.0374	.7654
170.00	.9021	3.6106	.8496	1.5688	.6880
180.00	0	0	0	0	0

DR(h,δ)

T = 40 Seconds   λ = 45°

θ	∂J/∂h Layer 1 to 2 ∂J/∂δ for Source in Layer 1	∂J/∂h Layer 1 to 2 ∂J/∂δ for Source in Layer 2	∂J/∂h Layer 2 to 3 ∂J/∂δ for Source in Layer 2	∂J/∂h Layer 2 to 3 ∂J/∂δ for Source in Layer 3	∂J/∂h Layer 3 to 4 ∂J/∂δ for Source in Layer 3
10.00	2.6122	3.1439	2.9614	- .5792	- .3472
20.00	8.2886	25.7988	24.4096	- .8342	- .4455
30.00	-8.3177	- 4.0892	- 4.1818	- .8317	- .3459
40.00	-1.2442	- .9397	- 1.6993	- .9091	- .2208
44.00	- .8780	- .7478	- 2.0003	- 1.4552	- .2508
50.00	.8194	.7317	.9840	3.5321	.3850
60.00	.9150	.7877	.0649	.1228	- .3026
70.00	.7706	.7157	- .5125	- 1.8726	-1.0160
80.00	.0395	.0472	- 1.0748	-14.9357	-3.0937
90.00	-1.7232	-14.6484	- 1.6131	100.9842	10.5388
100.00	- .0096	- .0323	.7360	8.6653	1.7948
110.00	- .1757	- .2739	.1961	1.3595	.7376
120.00	- .3756	- .3864	- .0318	- .0956	.2356
130.00	- .3343	- .3071	- .4130	- .8964	- .0977
134.00	- .3728	- .3494	- .9149	- 3.2319	- .4969
140.00	1.0683	.9309	1.6832	1.3268	.3222
150.00	5.2464	2.7758	2.8386	.9626	.4004
160.00	-5.3834	-34.8188	-32.9440	1.0650	.5688
170.00	-1.3345	- 2.5001	- 2.3550	.8216	.4925
180.00	0	0	0	0	0

θ	∂J/∂h Layer 3 to 4 ∂J/∂δ for Source in Layer 4	∂J/∂h Layer 4 to 5 ∂J/∂δ for Source in Layer 4	∂J/∂h Layer 4 to 5 ∂J/∂δ for Source in Layer 5	∂J/∂h Layer 5 to 6 ∂J/∂δ for Source in Layer 5	∂J/∂h Layer 5 to 6 ∂J/∂δ for Source in Layer 6
10.00	- .0197	.0005	.0020	.0656	.3545
20.00	- .1121	.0147	.0123	.0963	.1955
30.00	- .1368	.0487	.0434	.1614	.2366
40.00	- .1210	.0913	.0874	.2238	.2889
44.00	- .1410	.1303	.1274	.3061	.3927
50.00	- .3661	.9193	.8472	1.5733	9.6561
60.00	- .7949	-1.0977	-1.4123	-1.6596	-1.2495
70.00	-6.3518	-4.5519	-7.9975	-7.4573	-3.6682
80.00	15.2153	8.1458	7.6972	6.3591	22.0710
90.00	6.1899	3.0140	3.6346	2.8887	3.8787
100.00	3.4189	1.8304	2.3073	1.9062	2.1872
110.00	1.5475	1.1090	1.3846	1.2911	1.3788
120.00	.4322	.5968	.7148	.8400	.8562
130.00	- .1708	.4290	.4822	.8955	.7914
134.00	-3.3147	3.5998	4.3072	9.8033	2.6910
140.00	.2475	- .1867	- .1921	- .4916	- .5739
150.00	.2758	- .0981	- .0969	- .3605	- .4174
160.00	.3335	- .0437	- .0415	- .3244	- .3762
170.00	.2839	- .0078	- .0073	- .2395	- .2718
180.00	0	0	0	0	0

TABLE V

DR(h,λ)

T = 12 Seconds   δ = 90°

θ	∂J/∂h Layer 1 to 2 ∂J/∂λ for Source in Layer 1	∂J/∂h Layer 1 to 2 ∂J/∂λ for Source in Layer 2	∂J/∂h Layer 2 to 3 ∂J/∂λ for Source in Layer 2	∂J/∂h Layer 2 to 3 ∂J/∂λ for Source in Layer 3	∂J/∂h Layer 3 to 4 ∂J/∂λ for Source in Layer 3
10.00	1275.9627	-12.6025	4.7290	14.5351	2.0889
20.00	933.1501	-12.3178	4.6221	14.4292	2.0737
30.00	474.7773	-11.9447	4.4822	15.0362	2.1609
40.00	86.2402	-12.6551	4.7487	55.1954	7.9324
44.00	9.8354	41.4490	-15.5534	-2.6023	- .3740
50.00	116.6688	-11.0949	4.1633	19.3920	2.7870
60.00	1501.8526	- 9.5157	3.5707	9.3594	1.3451
70.00	68803.7575	- 8.7202	3.2722	8.0929	1.1631
80.00	-2104.7251	- 8.0097	3.0056	7.1809	1.0320
90.00	0	0	0	0	0
100.00	-2104.7246	- 8.0097	3.0056	7.1809	1.0320
110.00	68804.0735	- 8.7202	3.2722	8.0929	1.1631
120.00	1501.8528	- 9.5157	3.5707	9.3594	1.3451
130.00	116.6688	-11.0949	4.1633	19.3929	2.7870
134.00	10.2562	70.3324	-26.3916	-2.8505	- .4097
140.00	86.2402	-12.6551	4.7487	55.1954	7.9324
150.00	474.7773	-11.9447	4.4822	15.0362	2.1609
160.00	933.1501	-12.3178	4.6221	14.4292	2.0737
170.00	1275.9627	-12.6025	4.7290	14.5351	2.0889
180.00	0	0	0	0	0

θ	∂J/∂h Layer 3 to 4 ∂J/∂λ for Source in Layer 4	∂J/∂h Layer 4 to 5 ∂J/∂λ for Source in Layer 4	∂J/∂h Layer 4 to 5 ∂J/∂λ for Source in Layer 5	∂J/∂h Layer 5 to 6 ∂J/∂λ for Source in Layer 5	∂J/∂h Layer 5 to 6 ∂J/∂λ for Source in Layer 6
10.00	3.6575	-.1340	-.1420	.0908	.0904
20.00	3.6759	-.1346	-.1454	.0929	.0902
30.00	4.1075	-.1505	-.1756	.1123	.0988
40.00	-8.6560	.3171	.1553	-.0993	-.2586
44.00	- .3361	.0123	.0102	-.0065	-.0083
50.00	9.1398	-.3348	-1.4244	.9107	.1933
60.00	1.9854	-.0727	- .0736	.0470	.0478
70.00	1.6205	-.0594	- .0591	.0378	.0387
80.00	1.3802	-.0506	- .0502	.0321	.0326
90.00	0	0	0	0	0
100.00	1.3802	-.0506	- .0502	.0321	.0326
110.00	1.6205	-.0594	- .0591	.0378	.0387
120.00	1.9854	-.0727	- .0736	.0470	.0478
130.00	9.1398	-.3348	-1.4244	.9107	.1933
134.00	- .3638	.0133	.0110	-.0071	-.0090
140.00	-8.6560	.3171	.1553	-.0993	-.2586
150.00	4.1075	-.1505	- .1756	.1123	.0988
160.00	3.6759	-.1346	- .1454	.0929	.0902
170.00	3.6575	-.1340	- .1420	.0908	.0904
180.00	0	0	0	0	0

DR(h,λ)

T = 16 Seconds   δ = 90°

θ	∂J/∂h Layer 1 to 2 ∂J/∂λ for Source in Layer 1	∂J/∂h Layer 1 to 2 ∂J/∂λ for Source in Layer 2	∂J/∂h Layer 2 to 3 ∂J/∂λ for Source in Layer 2	∂J/∂h Layer 2 to 3 ∂J/∂λ for Source in Layer 3	∂J/∂h Layer 3 to 4 ∂J/∂λ for Source in Layer 3
10.00	803.0896	-25.7187	-12.0779	-2.6746	3.3010
20.00	584.1114	-24.5101	-11.5103	-2.6570	3.2792
30.00	293.4180	-23.2374	-10.9127	-2.6891	3.3188
40.00	50.3484	-38.1060	-17.8952	-3.7866	4.6733
44.00	5.0967	4.1152	1.9326	1.5549	-1.9190
50.00	69.1533	-20.8523	- 9.7926	-2.9064	3.5870
60.00	1006.5306	-12.0619	- 5.6645	-2.1287	2.6272
70.00	-6635.2122	- 9.3072	- 4.3708	-1.9716	2.4332
80.00	- 704.8194	- 7.2374	- 3.3988	-1.8481	2.2808
90.00	0	0	0	0	0
100.00	- 704.8193	- 7.2374	- 3.3988	-1.8481	2.2808
110.00	-6635.2040	- 9.3072	- 4.3708	-1.9716	2.4332
120.00	1006.5307	-12.0619	- 5.6645	-2.1287	2.6272
130.00	69.1533	-20.8523	- 9.7926	-2.9064	3.5870
134.00	5.3241	4.5109	2.1184	1.7740	-2.1895
140.00	50.3484	-38.1060	-17.8952	-3.7866	4.6733
150.00	293.4180	-23.2374	-10.9127	-2.6891	3.3188
160.00	584.1114	-24.5101	-11.5103	-2.6570	3.2792
170.00	803.0896	-25.7187	-12.0779	-2.6746	3.3010
180.00	0	0	0	0	0

θ	∂J/∂h Layer 3 to 4 ∂J/∂λ for Source in Layer 4	∂J/∂h Layer 4 to 5 ∂J/∂λ for Source in Layer 4	∂J/∂h Layer 4 to 5 ∂J/∂λ for Source in Layer 5	∂J/∂h Layer 5 to 6 ∂J/∂λ for Source in Layer 5	∂J/∂h Layer 5 to 6 ∂J/∂λ for Source in Layer 6
10.00	10.7571	1.6832	2.1276	2.0919	2.6662
20.00	10.7720	1.6855	2.1474	2.1114	2.6527
30.00	11.6085	1.8164	2.3962	2.3559	2.8385
40.00	1075.9334	168.3542	-8.1241	-7.9877	-32.1829
44.00	- 1.4982	- .2344	- .2356	- .2317	- .3102
50.00	17.9164	2.8034	4.7419	4.6623	4.4693
60.00	6.6983	1.0481	1.2617	1.2405	1.5191
70.00	5.7170	.8946	1.0586	1.0408	1.2615
80.00	5.0497	.7901	.9266	.9110	1.0833
90.00	0	0	0	0	0
100.00	5.0497	.7901	.9266	.9110	1.0833
110.00	5.7170	.8946	1.0586	1.0408	1.2615
120.00	6.6983	1.0481	1.2617	1.2405	1.5191
130.00	17.9164	2.8034	4.7419	4.6623	4.4693
134.00	- 1.6328	- .2555	- .2558	- .2515	- .3370
140.00	1075.9324	168.3541	-8.1241	-7.9877	-32.1829
150.00	11.6085	1.8164	2.3962	2.3559	2.8385
160.00	10.7720	1.6855	2.1474	2.1114	2.6527
170.00	10.7571	1.6832	2.1276	2.0919	2.6662
180.00	0	0	0	0	0

DR(h,λ)

T = 40 Seconds   δ = 90°

θ	∂J/∂h Layer 1 to 2 ∂J/∂λ for Source in Layer 1	∂J/∂h Layer 1 to 2 ∂J/∂λ for Source in Layer 2	∂J/∂h Layer 2 to 3 ∂J/∂λ for Source in Layer 2	∂J/∂h Layer 2 to 3 ∂J/∂λ for Source in Layer 3	∂J/∂h Layer 3 to 4 ∂J/∂λ for Source in Layer 3
10.00	543.1106	-1946.5281	-2642.9334	-15.0710	-31.4678
20.00	391.2632	1637.7327	2223.6609	-15.5345	-32.4355
30.00	192.4640	181.7297	246.7467	-21.6188	-45.1393
40.00	29.9003	15.6294	21.2211	5.2478	10.9571
44.00	2.0710	1.1256	1.5283	.4289	.8955
50.00	42.2716	24.9539	33.8816	17.3521	36.2307
60.00	777.6790	- 69.9839	- 95.0218	- 4.8697	-10.1678
70.00	-1374.7909	- 27.8354	- 37.7940	- 3.2671	- 6.8216
80.00	- 243.7620	- 9.0527	- 12.2915	- 2.3026	- 4.8077
90.00	0	0	0	0	0
100.00	- 243.7618	- 9.0527	- 12.2915	- 2.3026	- 4.8077
110.00	-1374.7885	- 27.8354	- 37.7940	- 3.2671	- 6.8216
120.00	777.6797	- 69.9839	- 95.0218	- 4.8697	-10.1678
130.00	42.2716	24.9539	33.8816	17.3521	36.2307
134.00	2.1801	1.1838	1.6073	.4565	.9532
140.00	29.9003	15.6294	21.2211	5.2478	10.9571
150.00	192.4640	181.7297	246.7467	-21.6188	-45.1393
160.00	391.2632	1637.7327	2223.6609	-15.5345	-32.4355
170.00	543.1107	-1946.5269	-2642.9318	-15.0710	-31.4678
180.00	0	0	0	0	0

θ	∂J/∂h Layer 3 to 4 ∂J/∂λ for Source in Layer 4	∂J/∂h Layer 4 to 5 ∂J/∂λ for Source in Layer 4	∂J/∂h Layer 4 to 5 ∂J/∂λ for Source in Layer 5	∂J/∂h Layer 5 to 6 ∂J/∂λ for Source in Layer 5	∂J/∂h Layer 5 to 6 ∂J/∂λ for Source in Layer 6
10.00	-4.3751	-17.5114	-3.8854	-7.1741	-3.1114
20.00	-4.3017	-17.2174	-3.8576	-7.1228	-3.1008
30.00	-4.3511	-17.4153	-3.8448	-7.0991	-3.0919
40.00	-9.5318	-38.1509	-4.2798	-7.9024	-3.1899
44.00	.9460	3.7863	34.2394	63.2208	-4.9420
50.00	-4.9423	-19.7813	-3.8760	-7.1567	-3.0849
60.00	-2.7944	-11.1847	-3.4053	-6.2877	-2.9479
70.00	-2.4159	- 9.6696	-3.2598	-6.0190	-2.8950
80.00	-2.1284	- 8.5190	-3.1320	-5.7830	-2.8453
90.00	0	0	0	0	0
100.00	-2.1284	- 8.5190	-3.1320	-5.7830	-2.8453
110.00	-2.4159	- 9.6696	-3.2598	-6.0190	-2.8950
120.00	-2.7944	-11.1847	-3.4053	-6.2877	-2.9479
130.00	-4.9423	-19.7813	-3.8760	-7.1567	-3.0849
134.00	1.0416	4.1691	186.0357	343.5027	-4.7025
140.00	-9.5318	-38.1509	-4.2798	-7.9024	-3.1899
150.00	-4.3511	-17.4153	-3.8448	-7.0991	-3.0919
160.00	-4.3017	-17.2174	-3.8576	-7.1228	-3.1008
170.00	-4.3751	-17.5114	-3.8854	-7.1741	-3.1114
180.00	0	0	0	0	0

DR(h,λ)

T = 30 Seconds δ = 90°

θ	∂J/∂h Layer 1 to 2 ∂J/∂λ for Source in Layer 1	∂J/∂h Layer 1 to 2 ∂J/∂λ for Source in Layer 2	∂J/∂h Layer 2 to 3 ∂J/∂λ for Source in Layer 2	∂J/∂h Layer 2 to 3 ∂J/∂λ for Source in Layer 3	∂J/∂h Layer 3 to 4 ∂J/∂λ for Source in Layer 3
10.00	526.9347	-256.0989	-462.9403	- 7.3945	-38.1354
20.00	380.0459	-317.6043	-574.1213	- 7.3123	-37.7117
30.00	187.4937	1133.6120	2049.1874	- 7.7081	-39.7527
40.00	29.7072	18.4676	33.3831	176.5304	910.4152
44.00	2.3144	1.3220	2.3897	.8389	4.3266
50.00	41.7452	33.7708	61.0462	-11.3871	-58.7265
60.00	745.4753	- 39.7761	- 71.9018	- 4.0595	-20.9359
70.00	-1422.4226	- 18.5598	- 33.5498	- 3.3313	-17.1804
80.00	- 248.7182	- 7.4359	- 13.4415	- 2.8191	-14.5390
90.00	0	0	0	0	0
100.00	- 248.7181	- 7.4359	- 13.4415	- 2.8191	-14.5390
110.00	-1422.4210	- 18.5598	- 33.5498	- 3.3313	-17.1804
120.00	745.4757	- 39.7761	- 71.9018	- 4.0595	-20.9359
130.00	41.7452	33.7708	61.0462	-11.3871	-58.7265
134.00	2.4294	1.3917	2.5157	.9109	4.6977
140.00	29.7072	18.4676	33.3831	176.5305	910.4154
150.00	187.4937	1133.6117	2049.1869	- 7.7081	-39.7527
160.00	380.0459	-317.6043	-574.1213	- 7.3123	-37.7117
170.00	526.9348	-256.0989	-462.9403	- 7.3945	-38.1354
180.00	0	0	0	0	0

θ	∂J/∂h Layer 3 to 4 ∂J/∂λ for Source in Layer 4	∂J/∂h Layer 4 to 5 ∂J/∂λ for Source in Layer 4	∂J/∂h Layer 4 to 5 ∂J/∂λ for Source in Layer 5	∂J/∂h Layer 5 to 6 ∂J/∂λ for Source in Layer 5	∂J/∂h Layer 5 to 6 ∂J/∂λ for Source in Layer 6
10.00	- 3.6705	- .4381	- .3932	4.4606	19.3739
20.00	- 3.6585	- .4367	- .3921	4.4481	19.1567
30.00	- 3.6676	- .4378	- .3925	4.4533	19.1138
40.00	- 4.0546	- .4840	- .4219	4.7870	24.0081
44.00	-44.8523	-5.3540	-1.2397	14.0647	-16.4158
50.00	- 3.7455	- .4471	- .3980	4.5153	19.6458
60.00	- 3.3551	- .4005	- .3665	4.1583	15.4338
70.00	- 3.2522	- .3882	- .3577	4.0580	14.3304
80.00	- 3.1648	- .3778	- .3500	3.9711	13.4106
90.00	0	0	0	0	0
100.00	- 3.1648	- .3778	- .3500	3.9711	13.4106
110.00	- 3.2522	- .3882	- .3577	4.0580	14.3304
120.00	- 3.3551	- .4005	- .3665	4.1583	15.4338
130.00	- 3.7455	- .4471	- .3980	4.5153	19.6458
134.00	-23.5681	-2.8133	-1.0553	11.9732	-19.3004
140.00	- 4.0546	- .4840	- .4219	4.7870	24.0081
150.00	- 3.6676	- .4378	- .3925	4.4533	19.1138
160.00	- 3.6585	- .4367	- .3921	4.4481	19.1567
170.00	- 3.6705	- .4381	- .3932	4.4606	19.3739
180.00	0	0	0	0	0

DR(h,λ)

T = 20 Seconds   δ = 90°

θ	∂J/∂h Layer 1 to 2 ∂J/∂λ for Source in Layer 1	∂J/∂h Layer 1 to 2 ∂J/∂λ for Source in Layer 2	∂J/∂h Layer 2 to 3 ∂J/∂λ for Source in Layer 2	∂J/∂h Layer 2 to 3 ∂J/∂λ for Source in Layer 3	∂J/∂h Layer 3 to 4 ∂J/∂λ for Source in Layer 3
10.00	644.2503	-54.8378	-2092.7418	-4.8497	4.0055
20.00	466.6341	-52.7728	-2013.9379	-4.8475	4.0037
30.00	232.3539	-54.0168	-2061.4138	-4.8491	4.0050
40.00	38.4799	76.7256	2928.0350	-4.9114	4.0564
44.00	3.5486	2.2616	86.3079	-5.5216	4.5604
50.00	53.3796	-90.6998	-3461.3253	-4.8624	4.0160
60.00	857.6700	-17.4598	- 666.3088	-4.7897	3.9559
70.00	-2598.4890	-11.0740	- 422.6120	-4.7682	3.9382
80.00	- 395.6496	- 6.9018	- 263.3899	-4.7491	3.9224
90.00	0	0	0	0	0
100.00	- 395.6495	- 6.9018	- 263.3899	-4.7491	3.9224
110.00	-2598.4868	-11.0740	- 422.6120	-4.7682	3.9382
120.00	857.6702	-17.4598	- 666.3088	-4.7897	3.9559
130.00	53.3796	-90.6998	-3461.3253	-4.8624	4.0160
134.00	3.7125	2.4128	92.0783	-5.4604	4.5099
140.00	38.4799	76.7256	2928.0350	-4.9114	4.0564
150.00	232.3539	-54.0168	-2061.4138	-4.8491	4.0050
160.00	466.6341	-52.7728	-2013.9379	-4.8475	4.0037
170.00	644.2504	-54.8378	-2092.7418	-4.8497	4.0055
180.00	0	0	0	0	0

θ	∂J/∂h Layer 3 to 4 ∂J/∂λ for Source in Layer 4	∂J/∂h Layer 4 to 5 ∂J/∂λ for Source in Layer 4	∂J/∂h Layer 4 to 5 ∂J/∂λ for Source in Layer 5	∂J/∂h Layer 5 to 6 ∂J/∂λ for Source in Layer 5	∂J/∂h Layer 5 to 6 ∂J/∂λ for Source in Layer 6
10.00	147.3938	2.5807	4.3311	2.9513	4.7770
20.00	146.9187	2.5724	4.3249	2.9471	4.7308
30.00	151.4278	2.6513	4.5422	3.0952	4.9084
40.00	278.7405	4.8805	14.1075	9.6132	18.2860
44.00	- 49.2925	- .8631	- .9091	- .6195	- .8230
50.00	176.9778	3.0987	5.8884	4.0125	6.2642
60.00	111.0030	1.9435	2.9902	2.0376	3.0065
70.00	100.8038	1.7650	2.6392	1.7984	2.5820
80.00	93.3080	1.6337	2.3915	1.6296	2.2741
90.00	0	0	0	0	0
100.00	93.3080	1.6337	2.3915	1.6296	2.2741
110.00	100.8038	1.7650	2.6392	1.7984	2.5820
120.00	111.0030	1.9435	2.9902	2.0376	3.0065
130.00	176.9778	3.0987	5.8884	4.0125	6.2642
134.00	- 54.8557	- .9605	- .9989	- .6807	- .9008
140.00	278.7405	4.8805	14.1075	9.6132	18.2860
150.00	151.4278	2.6513	4.5422	3.0952	4.9084
160.00	146.9187	2.5724	4.3249	2.9471	4.7308
170.00	147.3938	2.5807	4.3311	2.9513	4.7770
180.00	0	0	0	0	0